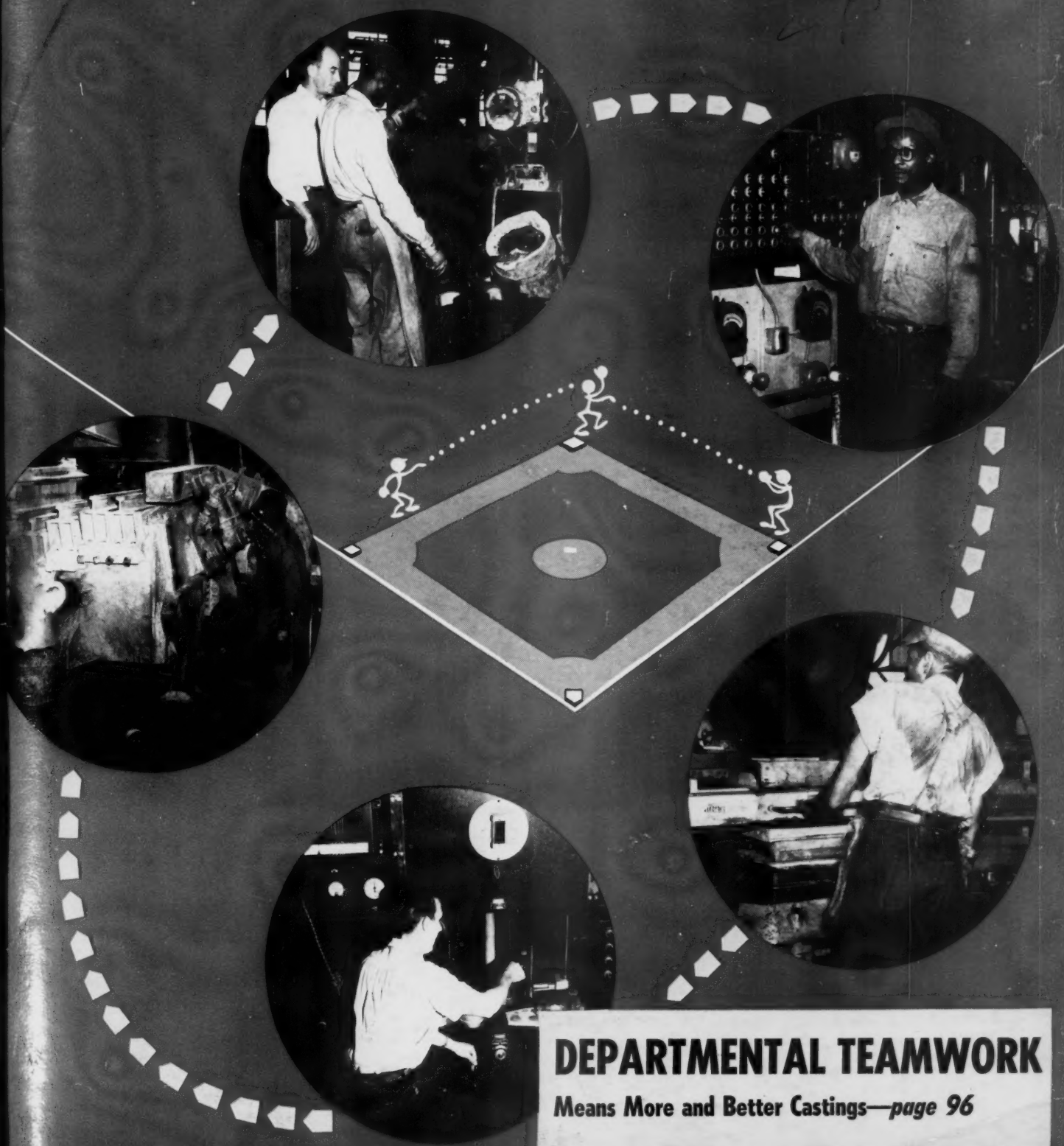
AUGUST 1952

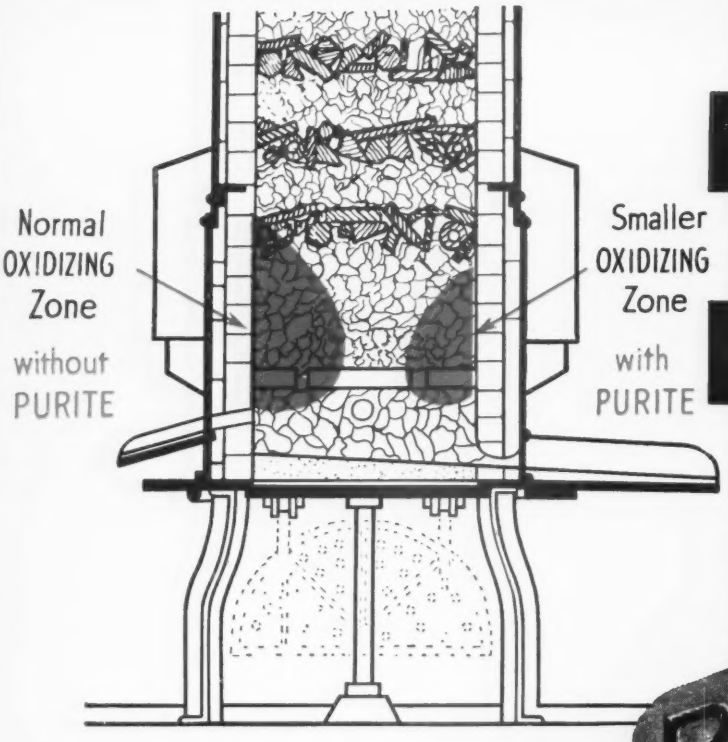
FOUNDRY

...WHEREVER METALS ARE CAST



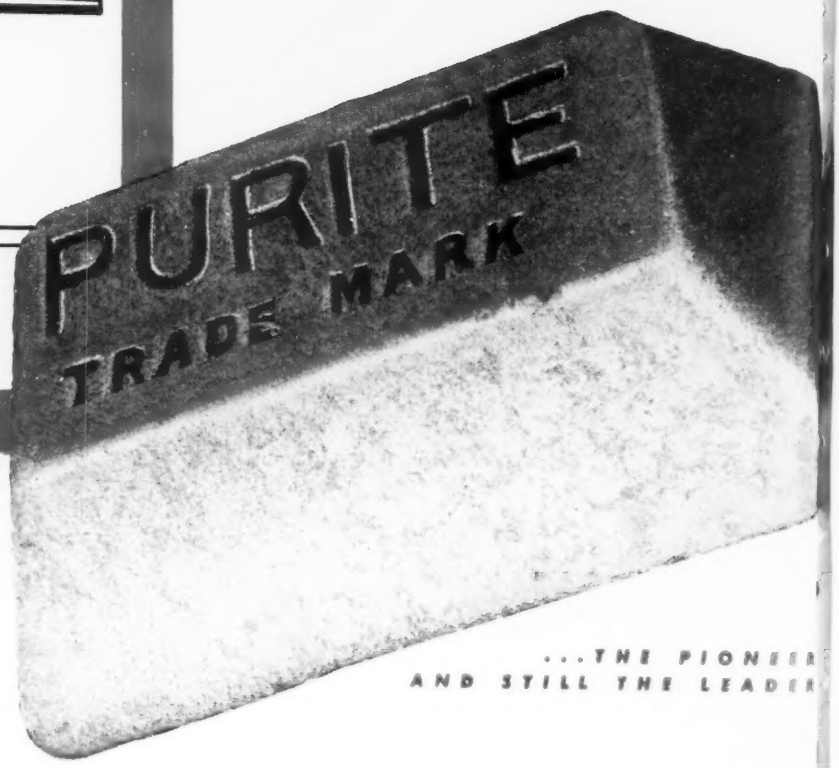
DEPARTMENTAL TEAMWORK

Means More and Better Castings—*page 96*



Keep Production Uniform

with PURITE in Every Melt



Purite produces a sodium (yellow) flame in the melting zone of the cupola and accelerates the combustion reactions $C \rightarrow CO_2 \rightarrow 2CO \rightarrow 2CO_2$, thus speeding up the combination of oxygen in the blast and carbon in the coke. In this way, Purite limits the zone of free oxygen in the cupola to a smaller hotter area, reduces oxidation of the metal and increases melting temperatures.

To get top production of finished castings from every melt, be sure you flux and desulphurize with Purite. It forms a highly active refining slag in the hearth of the cupola which expels entrapped gases and reacts with the impurities picked up by the iron in trickling down over the coke. Non-metallic inclusions are converted into liquid sodium-silicates that rise out of the metal and are carried off in the slag. Thus Purite, by expelling the impurities, which cause pinholes and segregated defects, improves the soundness and machinability of iron castings and reduces foundry losses.

For over 30 years, Purite has been the choice of leading foundries everywhere. Here's why:

1. Purite produces a higher percentage of finished castings per ton of metal poured.
2. Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle.
3. Purite gets to all the iron quicker.
4. Purite is time-tested and proven for unsurpassed desulphurizing uniformity.
5. Purite comes in 2-lb. pigs and 2 oz. tablets—no weighing or measuring required.
6. Purite is 100% pure fused soda ash—you do not pay for inert materials.
7. Purite does not crumble—no waste—no dust.
8. Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.

Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada. Mathieson Chemical Corporation, Baltimore 3, Maryland.

Mathieson
CHEMICALS

SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

NICKEL ALLOY IRONS
develop improved properties
plus all the basic advantages of plain cast iron

PLAIN GRAY IRON is, structurally, a steel matrix containing graphite flakes. Engineering, physical, processing and service properties are wholly dependent upon the character and disposition of these flakes, and upon the nature of the matrix.

The matrix of nickel alloyed irons closely resembles the pearlitic matrix found in high carbon steels, whereas the matrix of ordinary plain iron resembles that found in low carbon steels. Compositions of nickel alloy irons can be adjusted to reduce "chill" in thin sections without risk of forming "spongy" regions in heavy sections. This promotes uniform strength, improved machinability, pressure tightness and wear resistance.

Hardness in nickel cast irons results from improvement of the matrix. Chilled areas and hard carbides, which impair machinability, are obviated. Nickel improves response to heat treating. In fact, use of nickel alone or with other alloying elements plays an important part in meeting a variety of requirements.

Accordingly . . . nickel alloyed irons permit production of castings with high levels of the following properties:

Strength

Tensile and transverse strengths of castings are greatly increased by the addition of nickel to cast irons of properly adjusted base mixture. The ratio of compressive strength to tensile strength is retained. Greater uniformity of strength in thick and thin sections is achieved.

Elasticity

The elastic modulus increases with strength. In this respect nickel-containing irons of the high strength type possess good stiffness and do not deform permanently under loads that would be damaging to irons of lower elastic modulus.

Damping Capacity

The damping capacity inherent in gray cast iron is not impaired by the presence of nickel.

Wear Resistance

The uniformly pearlitic matrix of nickel cast irons appreciably improves wear resistance. The uniformly fine graphite flake distribution, achieved in suitably processed irons *without formation of a poor wearing dendritic condition,* affords optimum resistance to wear and galling.

Pressure Tightness

Characterized by dense grain structure and fine dispersion of graphite throughout, nickel alloy irons are close-grained and offer an extraordinary degree of pressure tightness under high hydrostatic pressures, without sacrificing machinability.

Applications

Heavy machinery frames and *beds* are typical of cast parts that benefit from the rigidity and good damping capacity of nickel cast irons. *Cylinder* and *pump liners, gears, dies, machine tool ways, saddles* and *tables* exemplify parts produced in nickel irons to assure greatly increased strength and wear resistance. And nickel alloyed iron is used for *heavy duty brake drums* to resist heat checking, thermal shock, wear and galling. The nickel cast irons are readily heat treated, and respond particularly well to flame and induction hardening.

At the present time, the bulk of the nickel produced is being diverted to defense. Through application to the appropriate authorities, nickel is obtainable for the production of engineering nickel cast irons for many end uses in defense and defense supporting industries.

The International Nickel Company, Inc.
Dept. TF, 67 Wall St., New York 5, N. Y.

Please send me booklet entitled, "Guide to the Selection of Engineering Cast Irons."

*Name*_____ *Title*_____

*Company*_____

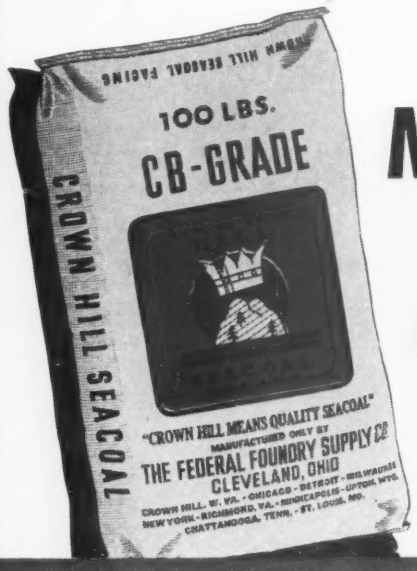
*Address*_____

*City*_____ *State*_____

EMBLEM OF INCO SERVICE
TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

MORE V.C.M.*



MAKES CROWN HILL A BETTER SEACOAL

Crown Hill is ground and screened in six different grades to match the grain size of molding sands. No matter what your class of work, FEDERAL has the correct grade of seacoal for it.

Research into the problems of seacoal performance has proved that, to make good seacoal, the base coal must be high in volatile combustible matter (V.C.M.). Low sulphur and ash content, also, are desirable. The coal mined by FEDERAL at Crown Hill more than meets such requirements. Note the V.C.M., sulphur and ash content in the analysis of Crown Hill coal made by the Bureau of Mines, U. S. Department of the Interior.

For comparison, check the analysis of the seacoal you're now using. Perhaps you'll find you're not getting the quality you'd get in Crown Hill.

PROXIMATE ANALYSIS
(Moisture Free)

Volatile Matter (V.C.M.)	38.9%
Fixed Carbon	57.4%
Ash	3.7%

ULTIMATE ANALYSIS

Hydrogen	5.4%
Carbon	82.0%
Nitrogen	1.6%
Oxygen	6.6%
Sulphur	.7%
Ash	3.7%
Fusion Point of Ash	2780° F

FEDERAL

The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET, CLEVELAND 5, OHIO

Seacoal Plant—CROWN HILL, W. VA. • CHICAGO • DETROIT • MILWAUKEE
RICHMOND, VA. • ST. LOUIS • CHATTANOOGA • NEW YORK • Mines—UPTON, WYO.

IN TWIN CITIES: Wisner and Company Commerce Station Box 71, Minneapolis 15, Minn.

FEDERAL

AUGUST 1952

FOUNDRY

Volume 80—Number 8

SPECIAL ARTICLES

Editorial	85
Bonding Clays in Synthetic Molding Sand By W. W. KERLIN	86
Gating for Shell Molding By WALTER A. SOKOLOSKY	92
The Engineer and the Foundry By DOUGLAS C. WILLIAMS	94
Perchloric Acid—It Can Be Used Safely By W. B. SOBERS	95
Departmental Teamwork Improves Casting Production By EDWIN BREMER	96
Refractory Permanent Molds By J. B. McINTYRE	102
Simple Correlation in the Foundry By W. K. BOCK	104
Induction Furnace Melting By B. SPINDLER	110
Malleable Founders' Society Annual Meeting By FRANK G. STEINEBACH	128
Man-to-Man on the Molder's Bench By RALPH L. LEE	190
Machinability of Gray Iron By EDWARD A. LORIA	194
ASTM Marks 50th Anniversary By EDWIN BREMER	212
Institute of British Foundrymen Annual Conference By VINCENT DELPORT	218
Foundry Worker Health Protection Conference By HOWARD C. TUTTLE	248
Extinguishing Magnesium Fires with Boron Trichloride	257

NEWS FEATURES

Around the Country	138
Calendar of Meetings	166
Foundry Group Activities	168
Industry Briefs	164
Late Foundry News	33
Men of Industry	120
News Views	154
Obituary	192
Statistics	133

DEPARTMENTS

ABC of Foundry Practice	205
Adventures of Bill By PAT DWYER	156
Advertisers' Index	298
Cupola Operation By BERNARD P. MULCAHY	146
Data Sheet	187
Foundry Developments	144
Ideas for Foundrymen	237
New Equipment and Supplies	234
Questions and Answers	114
Readers' Comment	80
Trade Publications	270
With the Editors	10

EDITORIAL STAFF

FRANK G. STEINEBACH
Editor

WILLIAM G. GUDE
Managing Editor

EDWIN BREMER
Metallurgical Editor

PAT DWYER
Engineering Editor

ROBERT H. HERRMANN
Associate Editor

VIRGINIA C. TAYLOR
Assistant Editor

VIRGINIA B. HARMS
Assistant Editor

DON S. CADOT
Art Editor

New York.....B. K. PRICE, L. E. BROWNE, SAMUEL W. BAKER
Detroit.....HOWARD C. TUTTLE
Chicago.....E. F. ROSS
Pittsburgh.....ROBERT E. HALL
Washington.....E. C. KREUTZBERG
London.....VINCENT DELPORT

Advisory Staff

JOHN W. BOLTON, JOHN HOWE HALL, ALBERT E. GROVER, HARRY A. SCHWARTZ, BERNARD P. MULCAHY

Main Office

Penton Building, Cleveland 13, Ohio
MAin 1-8260

Branch Offices

New York, 17.....60 East 42nd St. Murray Hill 2-2581
Chicago, 11.....520 N. Michigan Ave. Whitehall 4-1234
Detroit, 2.....6560 Cass Ave. Trinity 5-3024
Los Angeles, 48.....6262 Commodore Sloat Dr. Webster 1-6865
Pittsburgh, 19.....2837 Koppers Building Atlantic 1-3211
Washington, 4.....1123 National Press Building Executive 6849
London.....2 Caxton St. Westminster, S.W. 1

Published monthly by
THE PENTON PUBLISHING COMPANY

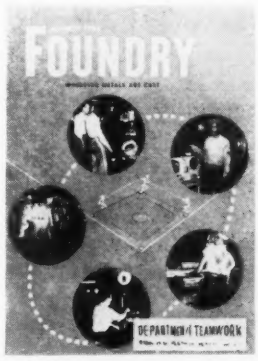
G. O. HAYS.....*President and Treasurer*
E. L. SHANER.....*Chairman*
R. C. JAENKE.....*Vice Pres., Director of Adv.*
F. G. STEINEBACH.....*Vice Pres., and Secretary*
J. P. LIPKA.....*Asst. Secy. and Asst. Treas.*
Also publisher of STEEL • MACHINE DESIGN NEW EQUIPMENT DIGEST

Subscription: United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $3; two years $5. Other foreign countries, one year, $10. Single copies 50 cents. Copies published three months or more previous to date of current issue, 75 cents.

Member: Controlled Circulation Audit Inc., National Business Publications, Inc., National Association of Magazine Publishers, and Society of Business Magazine Editors. Copyright 1952 by THE PENTON PUBLISHING CO. FOUNDRY is indexed regularly by Engineering Index Inc., 29 West 39th St., New York 18.

Entered as second class matter at postoffice at Cleveland, Ohio, under act of March 3, 1879.

Business Staff—Page 298



THE COVER: Showing scenes in various foundry departments of the Lunkenheimer Co., Cincinnati. See p. 96

Badger Malleable and Mfg. Co.

(South Milwaukee, Wisc.)

Cuts Baking Time In Half

WITH

INDUCTOL!

STEADY LINOIL USER DISCOVERS INDUCTOL TO BE BEST ANSWER TO SHORT BAKING CYCLE

Suddenly faced with the problem of producing cores almost twice the size of their usual work, Badger found that the added baking time needed for the larger work disrupted their tight oven scheduling.

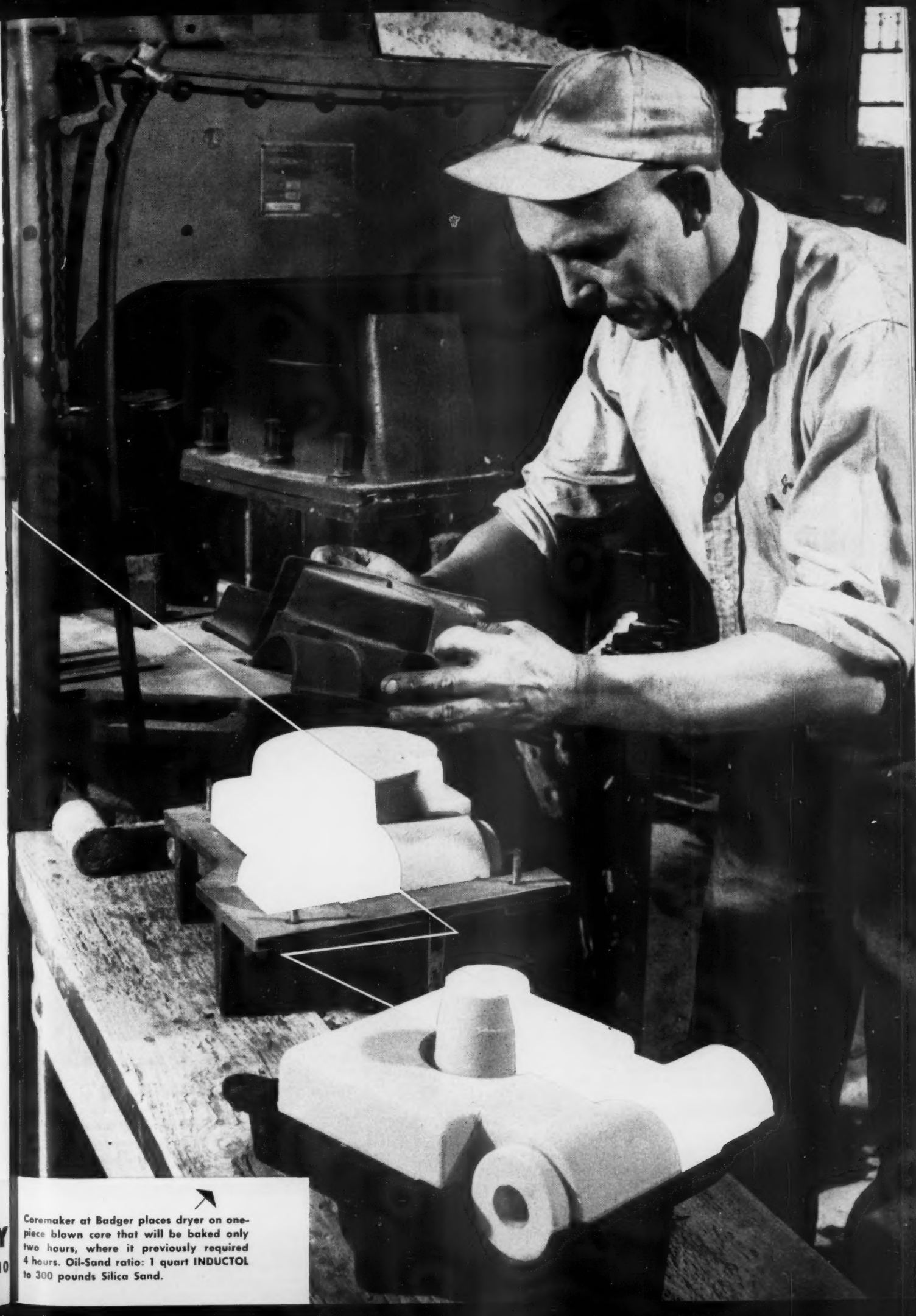
Consulting with their LINOIL representative, they heard about INDUCTOL, the "prebaked" core oil. They tried some and found that INDUCTOL cut *in half* the baking time for these larger cores. Furthermore, the cores were so well baked that the slight problem of an occasional cracked casting was completely eliminated.

Badger Malleable is enthusiastic about INDUCTOL's solution of their baking problem. If you have a problem that conventional core oil can't solve, ask your LINOIL man to tell you about INDUCTOL.

WRITE TODAY *for more information on* INDUCTOL. *A new booklet, "Facts about the* LINOIL *700 Series" is also available on request.*

ARCHER • DANIELS • MIDLAND COMPANY

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110TH STREET • CLEVELAND 2, OHIO



Coremaker at Badger places dryer on one-piece blown core that will be baked only two hours, where it previously required 4 hours. Oil-Sand ratio: 1 quart INDUCTOL to 300 pounds Silica Sand.

ROTOBLAST

HOW ROTOBLAST WORKS FOR YOU

SAVES LABOR with push-button operation
SAVES SPACE because machines are compact
SAVES TIME by cleaning more loads per day
SAVES POWER since no compressor is needed
SAVES TOOLS because all scale is removed

At Farrell-Cheek, this Pangborn Turn-Style Table is loaded on one side while cleaning takes place on the other. This feature alone saves the company $2159 a year on labor!

SAVES OVER $12,000 a year ON LABOR ALONE*

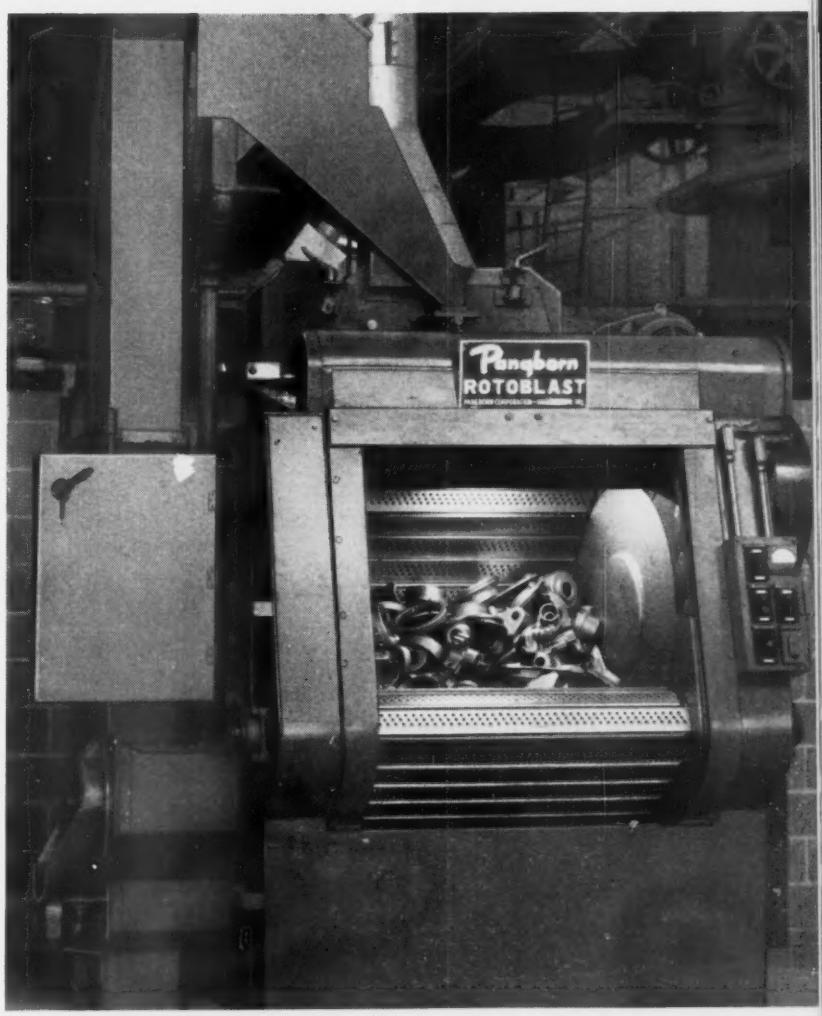
***Farrell-Cheek Steel Co., Sandusky, Ohio, reports:**

All-Pangborn-Equipped Cleaning Room Does Better Job at Lower Cost!

Five men released for other work! That's the labor saved by modern Pangborn ROTOBLAST in the cleaning room at Farrell-Cheek Steel Company. Management here went "all-Pangborn" more than 30 years ago . . . and here's why that policy is still maintained today:

Seven ROTOBLAST Machines and a dependable Pangborn Airblast Room clean hundreds of tons of castings each week. Production per hour has been increased . . . yet manpower requirements have been sharply reduced. Result: a $12,107 savings on labor each year!

ROTOBLAST can save you money, too! Whether you need Barrels, Tables, Rooms, or special equipment . . . Pangborn has the right ROTOBLAST equipment for every job. For more details, write us today for free Bulletin 214 to: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Maryland.



Pangborn Corporation is happy to announce that the judges have declared Mr. John B. Lotz, Jr., Western Electric Co., Baltimore, Md., the winner of Pangborn's "Name the Barrel" contest. His winning name for the new Pangborn "GN" ROTOBLAST Barrel, postmarked earliest of several similar entries, is "Blast Master."

OVER 28,000 PANGBORN MACHINES SERVING INDUSTRY

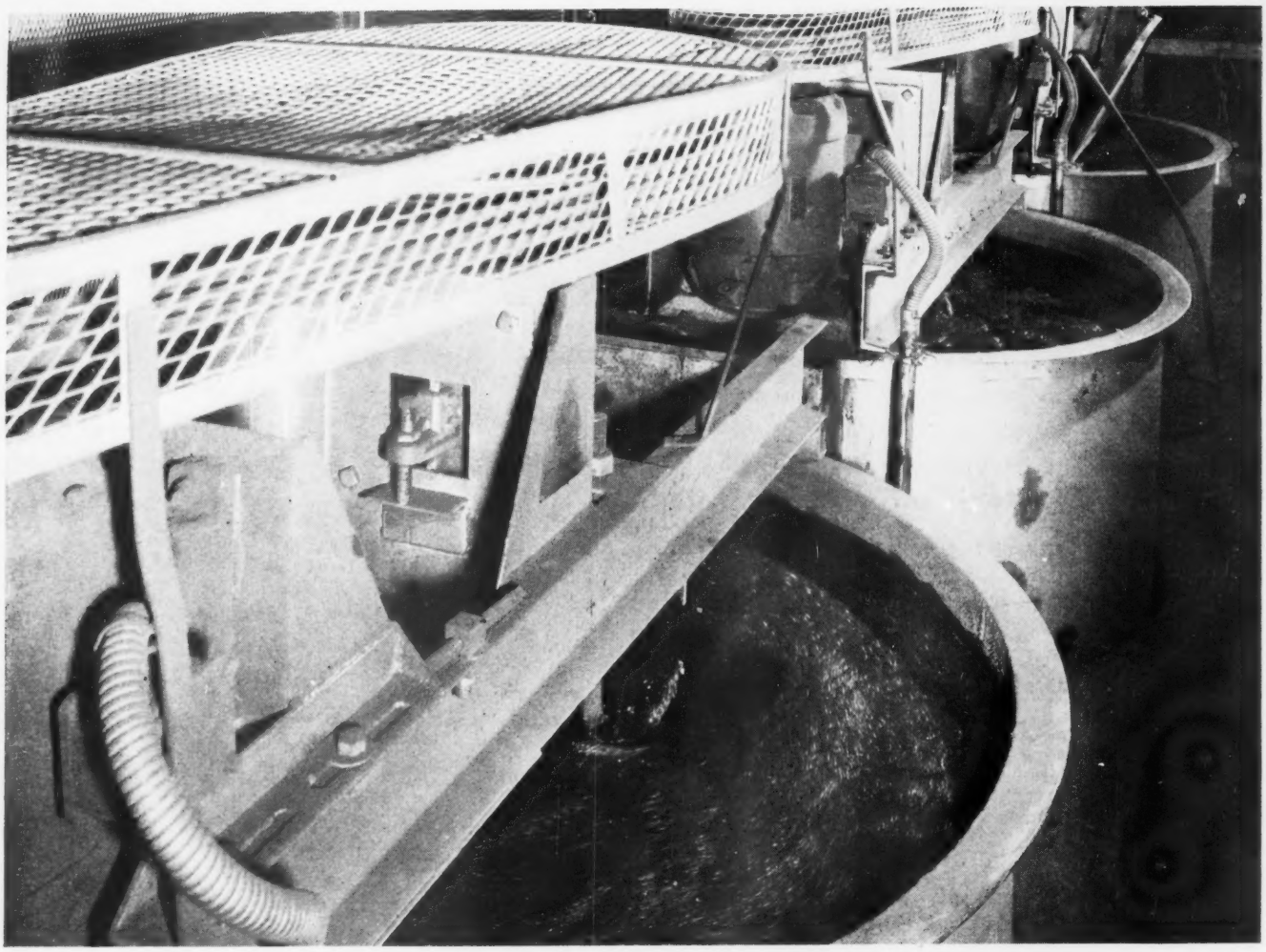
Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

MEMBER FEMA

Pangborn

BLAST CLEANS CHEAPER

with the right equipment for every job



Foundry Sand Costs Can Be Cut As Low As 75¢ A Ton With Denver Reclamation

You can increase your profits by using a Denver Sand Reclamation System. If your new foundry sand costs, delivered, are above $2 a ton, you can cash in on extra profits with Denver reclamation. Denver Sand Reclamation Systems recover sand for as low as 75c a ton. Many foundries prefer reclaimed sand for quality castings.

Denver Sand Reclamation Systems report daily savings of $200 to $400 on new sand costs. One of the big factors of high production and low costs is the patented Denver Heavy Duty Sand Scrubber, pictured above. Bonding material and slime on the surface of sand grains are removed by attrition of grains striking one another at high velocity in a water and sand mix.

Controlled recirculation without short circuiting insures complete scrubbing. Scrubbing mechanisms are of extra heavy construction with abrasion-resistant rubber covered parts in areas of high wear. The scrubber will start on a full load—no sanding up on shutdowns. Water consumption is low. You get simplicity of installation and operation, and an 80% to 90% recovery.

Equipment cost for the average small foundry, treating 2 to 3 tons of sand an hour, is approximately $6,250 fob factory, exclusive of drying equipment.

Denver Equipment Company has been a leader in mineral flotation and recovery equipment for 25 years. Our engineers can plan and supply you with all necessary equipment for a complete Foundry Sand Reclamation System. Find out how you can cut your foundry sand costs to as low as 75c a ton! Write, wire or phone today for test, horsepower and floor space data.

Our 25th year

DENVER EQUIPMENT COMPANY

1400 SEVENTEENTH ST. DENVER, COLORADO

COLEMAN TOWER* OVENS

provide *maximum* production in *minimum* space...

Coleman Tower Ovens, with patented open center, increase oven loading accessibility and improve productivity of coremakers. Labor saving up to 75% is obtained by eliminating trucks, racks and other handling methods. Coleman Tower Ovens use only 25% of the space required for batch-type ovens of the same core capacity.

Coleman Tower Ovens can meet accelerated demands for cores despite limitations of labor and space. Our engineers are available, without obligation, to show you how. Write for Bulletin 48.

Only COLEMAN TOWER OVENS offer all these advantages:

EFFICIENT HANDLING METHODS eliminate delays and losses.

PERFECT CORE BAKING ends manpower and casting losses due to make-overs and rejects.

INCREASED PRODUCTION by making the most efficient use of skilled and unskilled labor.

SUPERIOR WORKING CONDITIONS...cores are cooled and smoked-off before leaving oven.

HEAVY DUTY CONSTRUCTION for continuous dependable performance and economical operation.

GREATEST SAVINGS IN FUEL by using the most economical fuel available.

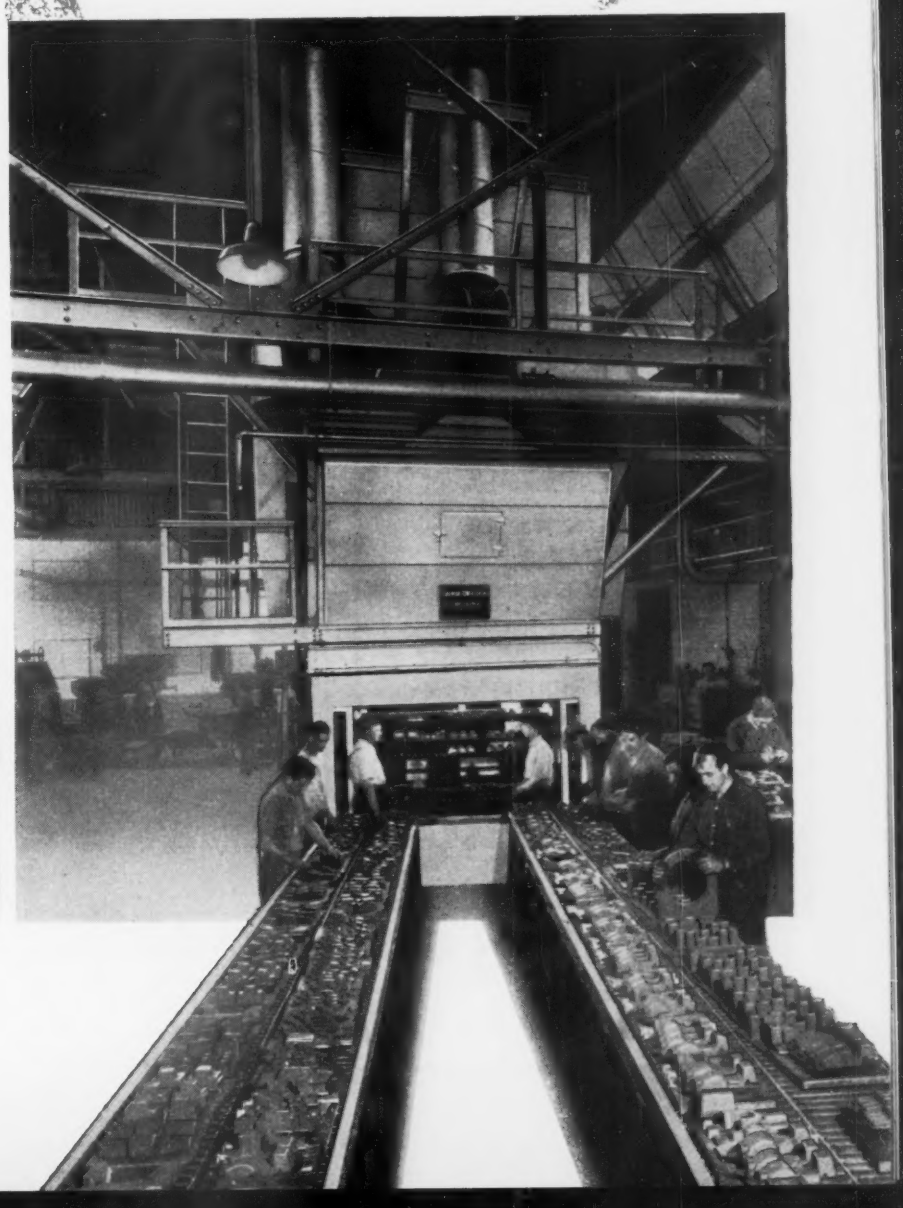
SAVE BINDER. Proper core baking atmosphere and uniform temperature permit important savings in conventional binders.

USE HIGH SPEED CORE BINDERS. Coleman ovens have uniform temperature and accurate control to handle temperature-sensitive resins; pre-baked oils.

*Trademark

A COMPLETE RANGE OF TYPES:

COLEMAN OVENS are built in a complete range of sizes and capacities for every core-baking and mold drying requirement: Tower Ovens, Horizontal Conveyor Ovens, Car-Type Ovens, Transrack Ovens, Rolling Drawer Ovens, Portable Core Ovens, Portable Mold Dryers, etc.



The Foundry Equipment Co.

1831 COLUMBUS ROAD, CLEVELAND 13, OHIO

World's Oldest and Largest Foundry Oven Specialists

SAHARA
Heat Resisting
BELTING
For Handling
Hot Materials

Foundry records prove Sahara Belting is unexcelled for conveying and elevating hot materials.

Special Construction—The heat resisting efficiency of Sahara Belting is due to special impregnation and insulation developed by Imperial during the past 40 years. The base of both Sahara and Insulated Sahara is 37½-ounce, tight-woven duck with a tensile strength of over 700 lb. per inch of width. Ply separation is permanently prevented by our double-stitched, Inner-Locked construction.

Heat Resistance—For temperatures up to 300° F., STANDARD SAHARA is recommended. For 300° to 450° F., use INSULATED SAHARA which combines asbestos and special insulating materials with the tight-woven silver duck base. SUPER-INSULATED SAHARA has double plies of asbestos and insulation to withstand sustained heat up to 600° F.

Write for Data Sheet 47-8 and prices on Sahara Belting.

IMPERIAL BELTING CO.
1755 S. Kilbourn Ave., Chicago 23, Ill.

Imperial
INNER-LOCKED
BELTING
Engineered Belting—
The Right Belt for Each Job

With the EDITORS

OSCAR for 1952: During the recent annual meeting of the Malleable Founders' Society, Lowell D. Ryan, managing director, presented the Society's "Oscar" for 1952 to the editor. This handsome award consists of the reproduction of a foundry worker, cast in malleable iron, and mounted on a wooden base, with a metal band carrying an inscription. The statuette was produced at the plant of Cal C. Chambers, president of the society. The inscription reads: "Presented to Frank G. Steinebach, good friend, helpful adviser and staunch supporter of the malleable iron industry, by the Malleable Founders' Society, June 16, 1952." The editor is deeply grateful to President Chambers, the Board of Directors and Managing Director Ryan for the thought behind this award and for the kind words spoken in the presentation.

—o—

Precision Means Progress: One of the most interesting and instructive booklets to cross our desk in some time is a job entitled "Precision—A Measure of Progress," published by General Motors Corp. This 63-page booklet, with 59 illustrations in color, traces the development of measuring devices from the time of Noah to today, and indicates how this progress has made possible the American system of mass production and interchangeability of parts. Modern methods, which include such things as electrons, air flow, light waves, supersonic sound waves and high-frequency radio waves, are employed as aids for the present maximum in accuracy. These newer types of measuring devices have brought accuracy of millionths of an inch, with possibilities of billionths. Copies of the booklet are available in limited quantities to teachers in schools and colleges, libraries and other educational institutions. Mail the requests to General Motors Educational Relations Activity, Detroit 2.

—o—

Moving Industrial Products: The editor was privileged to attend the 30th annual conference of the National Industrial Advertisers Association in Chicago, June 29 to July 2. Listening to the discussion of this highly trained group on the problems of marketing industrial goods

(Concluded on page 12)

Bohn Aluminum & Brass Corp., Detroit, recently was presented the Freedom Foundation's plaque for the company's outstanding and informative campaign to combat communism. R. J. Roshirt (center) executive vice president is accepting the plaque from W. C. Sawyer (right) vice president of Freedom Foundation, while Clyde Adams, secretary of Bohn looks on.

INTERESTED IN *Reducing* SCRAP LOSS?

try Harbison-Walker's

Refractory Strainer Cores

Many foundries have reduced scrap loss and improved their castings by adopting Harbison-Walker Refractory Strainer Cores. Made of a hard, strong ceramic material, moulded under pressure and kiln-fired at a high temperature, they are uniformly accurate in shape and size, cleanly formed, non-spalling, erosion-resistant and economical.

With equivalent gate diameters ranging from ⅝-inch to 1½-inch, Harbison-Walker Refractory Strainer Cores in seven sizes provide for all normal requirements.

Cleaner castings are made when Harbison-Walker Refractory Strainer Cores are used; chipping, welding and grinding are substantially reduced; scrap losses are decreased; production is increased and labor costs are reduced.

Now available for prompt shipment, Harbison-Walker Refractory Strainer Cores are packed in sturdy cartons of a size and shape most convenient for the moulder. Write for bulletin describing this modern aid to economical foundry operation.

HARBISON-WALKER REFRACTORIES COMPANY AND SUBSIDIARIES

World's Largest Producer of Refractories
General Offices: Pittsburgh 22, Pa.

they're both right with

SIMONDS ABRASIVE CO.

Grinding Wheels

Resinoid or Vitrified bond? It's a question of speed!

For high speed grinding, the right answer is Simonds Resinoid bonded wheels. For low speed, it's Simonds Vitrified bonded wheels.

Right now *you* may have a grinding problem. Chances are that Simonds Abrasive Company's complete line has the right answer for you. It includes grinding wheels of every essential combination of grain, grade and bond—mounted wheels and points—segments and abrasive grain—accurately specified production tools available through your Simonds distributor. Let's send you his name, and free data book. Write

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

(*Concluded from page* 10)

was most interesting and instructive. These men and women are intensely interested in promoting a better understanding of industrial advertising as a means of merchandising the products of a greatly enlarged industrial plant. New officers of the association are: President, Gene Wedereit, director of advertising, Girdler Corp. and Tube Turns Inc., Louisville; vice presidents for two years, J. Whitford Dolson, Hercules Powder Co., Wilmington, Del., Winston H. McCallum, Douglas Fir Plywood Association, Tacoma, Wash., William C. Sproull, Burroughs Adding Machine Co., Detroit, and Frank Wright, Cockfield Brown & Co., Montreal. George Black, public relations manager, Cooper Alloy Foundry Co., Hillside, N. J., was named secretary-treasurer.

—o—

Awards: Numerous prize awards to individuals and organizations were made during the NIAA conference. First prize of $1000 in the annual Putman awards contest was won by the Frank G. Hough Co., Libertyville, Ill. The award is based on dem-

onstrated industrial advertising effectiveness in making sales. The illustration here shows Raymond P. Wiggers (right), advertising manager of the Hough company, receiving the award from Col. Russell L. Putman, while the company's advertising counsel, Ervin R. Abramson and Ray B. Thomas of Milwaukee, look on. Congratulations to Hough company, its advertising manager, and the agency on this honor.

—o—

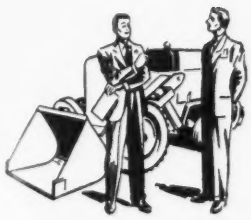
Kennedy Tribute: So many people have asked for copies of George Pope's fine tribute to Bob Kennedy, published in the June issue of FOUNDRY, that we have made reprints. If you would like a copy, send in your request.

—o—

Wrong Address: Every once in a while we receive mail addressed to the "Pentagon" Building here in Cleveland. Of course, the Penton Building probably isn't as well known as the Washington military lair, but it's a lot older. F.G.S.

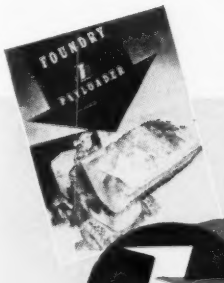
Laborer. ● ● 1952 MODEL

No matter how good a man may be with a hand shovel and wheelbarrow, his production is many times greater as a "PAYLOADER" pilot. What's more — both he and his boss are happier because they both make more money.



In hundreds of foundries "PAYLOADERS" have taken over unpleasant, laborious material-moving chores — saving time, cutting costs and increasing production. They scoop up, carry, dump, spread and stockpile all kinds of materials . . . lift, push . . . spot and unload box cars . . . handle sand, coal, cake, scrap, slag and ashes . . . remove snow and do many other cost-cutting jobs . . . release manpower for more productive work.

Every "PAYLOADER" is a complete Hough-built tractor-shovel *designed specifically for tractor-shovel work,* with multiple reverse speeds, large pneumatic tires and other features that insure fast, low-cost performance over floors or unpaved ground, up and down ramps, through congested areas. The "PAYLOADER" is sold by a world-wide Distributor organization with complete service facilities, and seven sizes are available from 12 cu. ft. to 1½ cu. yd. bucket capacity. The Frank G. Hough Co., 703 Sunnyside Ave., Libertyville, Illinois.



JOB STUDIES

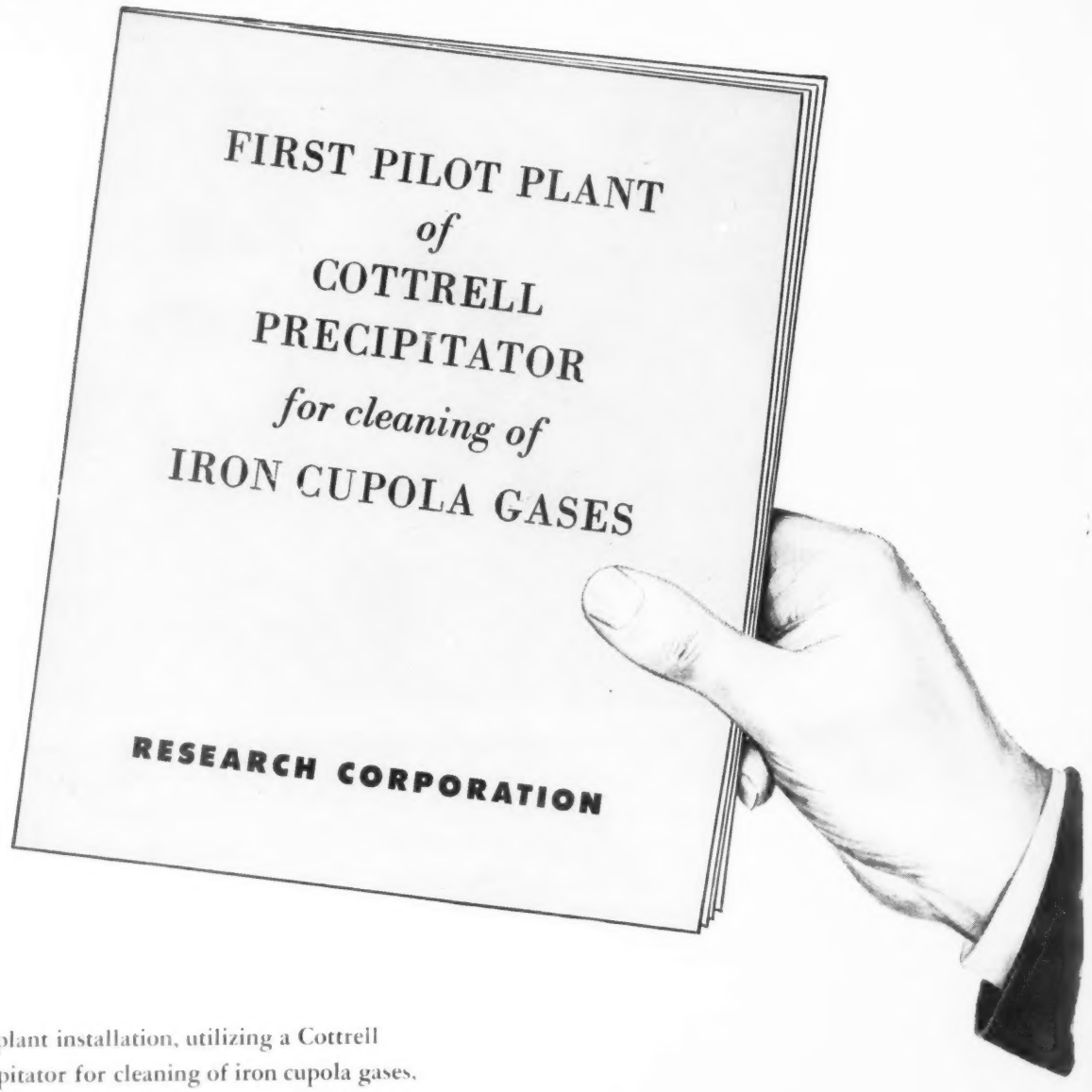
are available without cost or obligation. Each one is a detailed, authorized word-and-picture report of "PAYLOADER" performance in a specific plant. A request on your letterhead is all that's necessary.

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. · Since 1920

News on a New Process



The first pilot plant installation, utilizing a Cottrell Electrical Precipitator for cleaning of iron cupola gases, had resulted in detailed findings of industry-wide importance. On the basis of facts unearthed about cupola operation and the study of the design factors involved in this project, foundries have already placed orders for 15 precipitators with Research Corporation.

Ask your Research Corporation representative to go over the findings of this first pilot plant installation with you. His recommendation on your specific problem is based on 39 years of experience in the design and erection of over a thousand Cottrell Electrical Precipitators.

RESEARCH CORPORATION

405 Lexington Avenue
New York, New York

122 South Michigan Avenue
Chicago 3, Illinois

Bound Brook, New Jersey

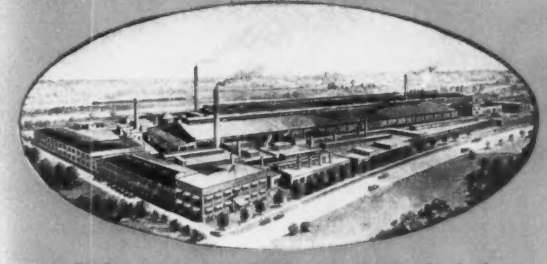
RC-133

Use FANNER CHAPLETS and CHILLS

IMPORTANT!

Two motion picture films —one on the use of Chaplets, the other on the use of Chills — are available, free of charge, for showing at Foreman Club meetings, in technical schools, A. F. S. chapter meetings, etc. Write for reservation.

for BETTER CASTINGS



Birdseye view of the Fanner Brookside Park Plant in Cleveland

More than 50 years of sound basic Chaplet and Chill designing for specific needs plus metallurgically correct materials give Fanner Chaplets and Chills an unmatched record in the reduction of scrap losses. Added economies are also effected because the Fanner line includes many as "standards" priced elsewhere as "specials".

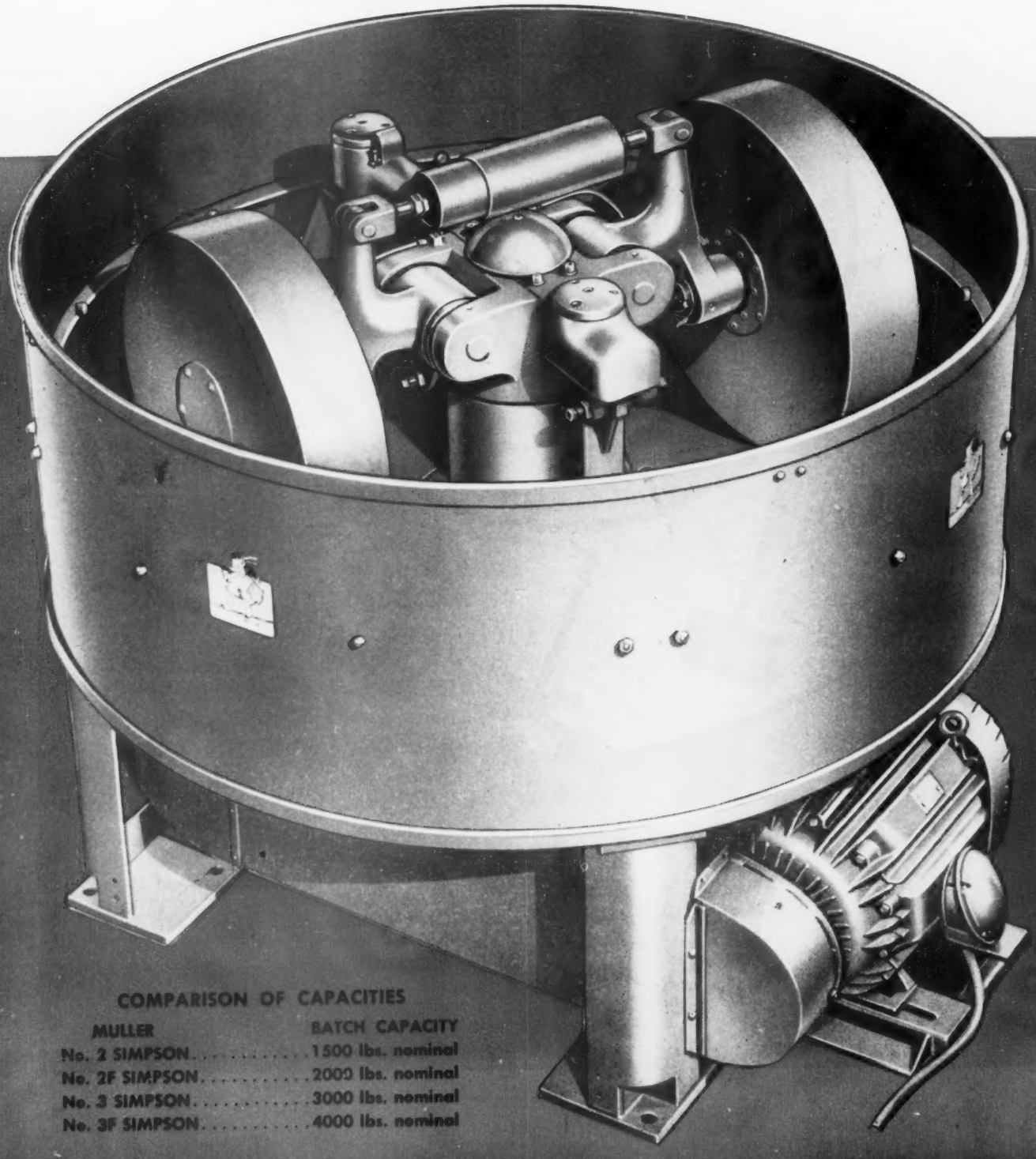
Your problems are welcomed by our Engineering department. No obligation. May we hear from you?

THE FANNER MFG. CO., CLEVELAND 9, OHIO

In Canada: CANADIAN FANNER, LTD., Hamilton, Ont. Canada

33 1/3 % MORE CAPACITY

with the New 2F and 3F
SIMPSON *Intensive* Mix-Mullers



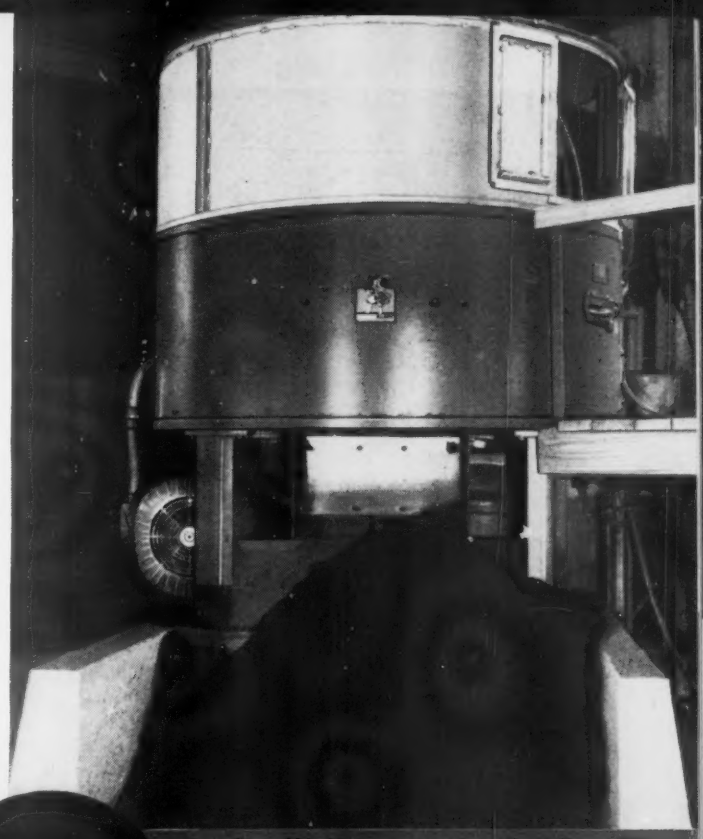
COMPARISON OF CAPACITIES

MULLER	BATCH CAPACITY
No. 2 SIMPSON	1500 lbs. nominal
No. 2F SIMPSON	2000 lbs. nominal
No. 3 SIMPSON	3000 lbs. nominal
No. 3F SIMPSON	4000 lbs. nominal

NEED increased production? Then remember that one of the most important features of the new 2F and 3F Simpson Intensive Mix-Mullers is their ability to handle at least one-third more capacity than the standard No. 2 and No. 3 mullers. Equally important is the ability of these modern, heavy duty mullers to produce the highest quality sand . . . which in turn assures highest quality castings, with less rejects, lower scrap loss.

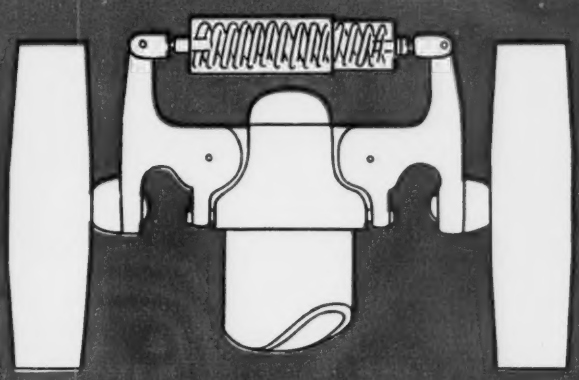
These 2F and 3F Simpsons are the culmination of years of specialized experience in the design and manufacture of Intensive Mullers. They are engineered to meet the widest possible range of sand requirements throughout the foundry industry.

Why not let our engineers prove what these high production Mix-Mullers can do for you? In the meantime send for a copy of our descriptive Bulletin 511.



PROVED IN USE

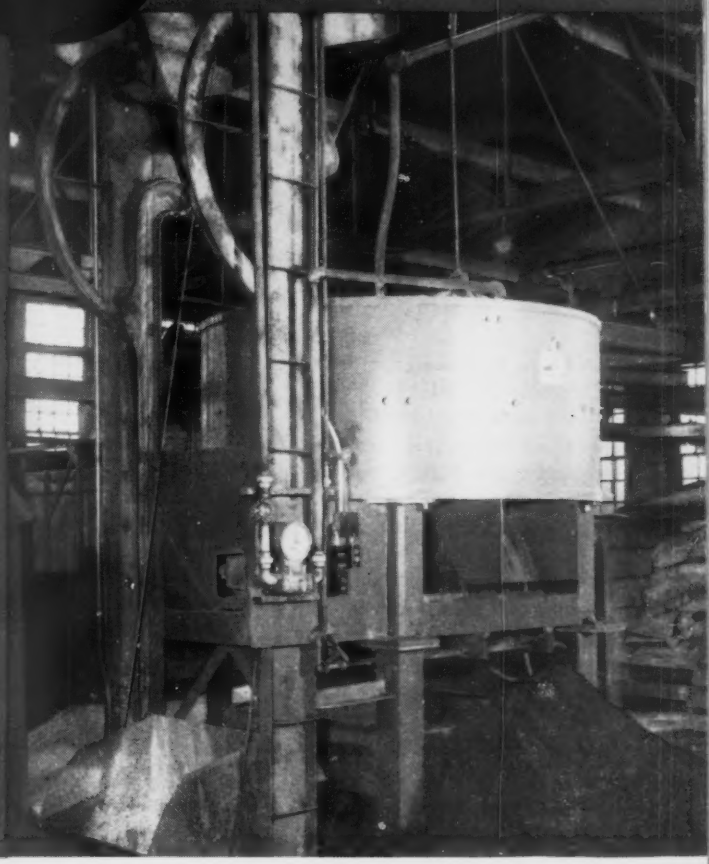
Over 200 Simpson Intensive Mix-Mullers with the new adjustable muller design have been thoroughly proved in use. The 2F and 3F units illustrated here, installed in two large midwestern foundries, are typical of the Simpson units now producing greater quantities of properly prepared sand.



SPRING-LOADED MULLERS MAKE THE *BIG DIFFERENCE*

- The comparatively lighter mullers with adjustable spring pressure, as used in the 2F and 3F Mix-Mullers, greatly increases the efficiency of the mulling action, as the pressure can be adapted to the type of sand to be conditioned.

Because of the plow design and the muller suspension, the sand is subjected to much more violent agitation, and is considerably increased in volume. The agglomerate grains are broken up, any tendency to form "muller cake" is reduced, and a fluffy sand of high flowability results.



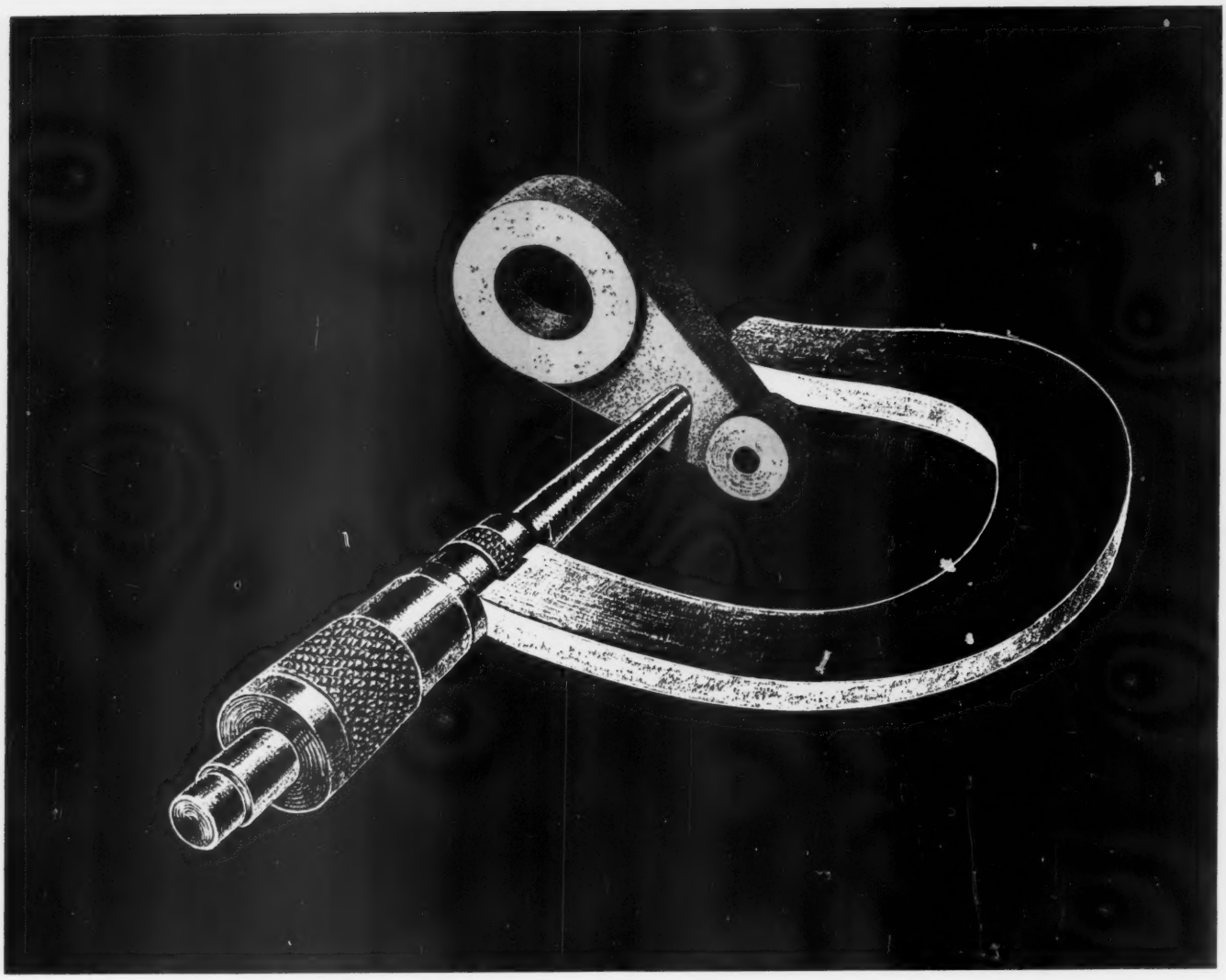
Write for BULLETIN 511

SIMPSON *Intensive* MIX-MULLERS

National Engineering Company

608 Machinery Hall Bldg. • Chicago 6, Illinois

Manufacturers and Selling Agents: For Continental European Countries — George Fischer, Ltd., Schaffhausen, Switzerland; for British Possessions — August's Limited, Halifax, England; for Canada — Dominion Engineering Co., Ltd., Montreal; for Australia and New Zealand — Gibson, Battle & Co., Pty., Ltd., Sydney; for Argentina, Brazil and Uruguay E equipamentos Industriais EISA Ltda., Sao Paulo, Brazil; for Mexico — GASCO S. De R.L., Mexico, D.F.



CLOSE-TOLERANCE CASTINGS—HIGH-YIELD PRODUCTION

Using thin-shell molds and cores of fine grained sands bonded by BAKELITE Phenolic Resins results in castings that need only a minimum of finishing. Surfaces are almost pattern-smooth, and tolerances are as close as .003 to .005 of an inch per inch. The high yield of good castings, ferrous or non-ferrous, means a greater number of castings per ton of metal poured.

The shell-molding process forms highly porous molds that permit the free escape of gases. There is no burnt-on or burnt-in sand on metal. Built-in guide pins and holes assure accurate registration of mold parts so that allowance for mold shift is unnecessary.

Molds and cores are strong, moisture-resistant, and stable, with long storage life. Far lighter than those made with ordinary materials, they spell notable savings in handling effort and space.

Yielding smoother, better castings, using less sand, meeting heavy production schedules, this process means new economy for foundry operations.

For information about the BAKELITE Phenolic Resins developed for the shell-molding process, fill out and mail the attached coupon.

Dept. DO-291, BAKELITE COMPANY,
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

Please mail my free copy of Booklet C-8, "BAKELITE Phenolic Resins for the Shell Molding Process."

Name _____ *Title* _____

Company _____

Street _____

City _____ *State* _____

BAKELITE
TRADE-MARK
PHENOLIC
BONDING RESINS

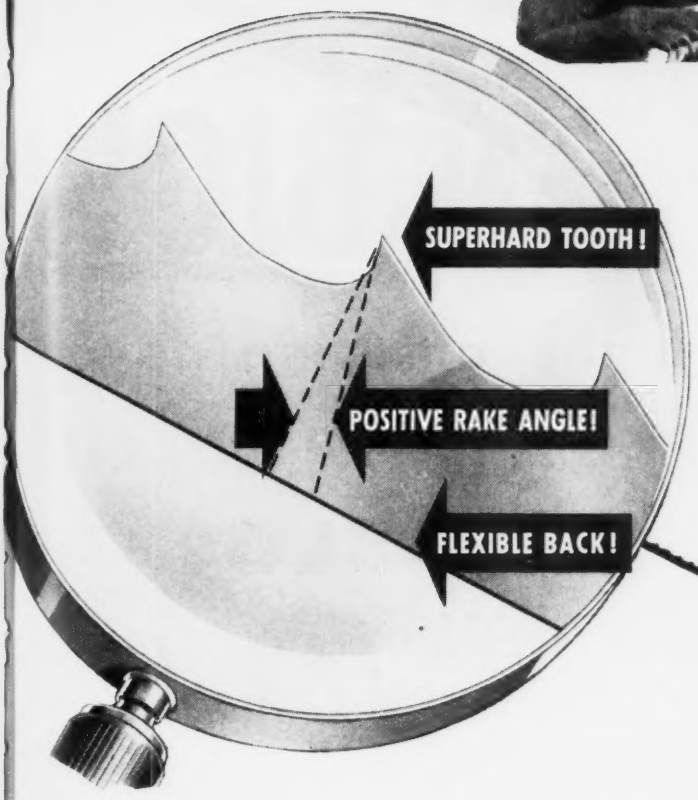
TRADE (B) MARK

BAKELITE COMPANY
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.
In Canada:
Bakelite Company (Canada) Ltd., Belleville, Ont.

NEW!

DoALL CLAW TOOTH SAW BAND...

FOR METALS, WOODS, PLASTICS
EXTRA FAST CUTTING,
EXTRA LONG LIFE



Widths from ¼" to 1½". 2, 3, 4 and 6 pitch, depending on width.

NOW, for the first time, in the DoALL Claw Tooth saw band, mass production of a blade combining a *positive rake angle, hardened teeth* and a *flexible back* has been achieved.

Faster, free cutting with less feed pressure results from the hooked, claw-like teeth which actually "pull" into the material being sawed.

The superhard teeth give longer blade life with substantially higher cutting efficiency up to time of replacement than that of non-hardened blades which must be resharpened periodically.

The result is a blade that industry has been waiting for—a blade that reduces bandsawing costs and increases production when properly applied.

Ask for Literature

Complete information, prices, specifications available upon request. Call your local DoALL Sales-Service Store or write:

THE DoALL COMPANY
254 N. Laurel Ave., Des Plaines, Ill.

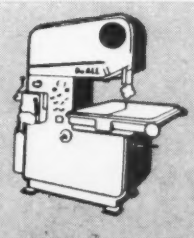
Eliminates Resharpening and Resetting—**it's cheaper to replace long-lived Claw Tooth blades than to use blades which must be resharpened a number of times during their life.**

Increases Production — **more output per machine and manhour because of faster cutting and elimination of blade removal for resharpening.**

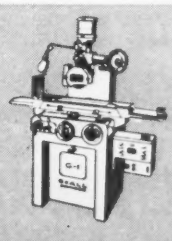
Cuts Costs—**higher production and elimination of blade maintenance labor and equipment means lower bandsawing costs.**

DoALL

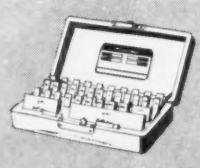
SB-16



BAND MACHINES



SURFACE GRINDERS



GAGE BLOCKS

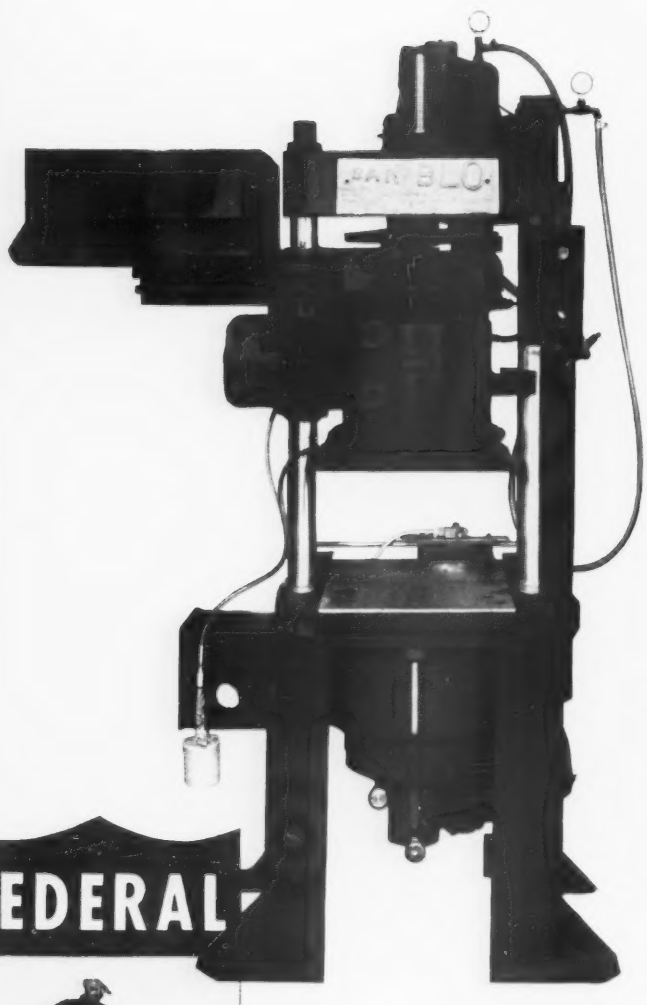
GAGING EQUIPMENT

MOBILE INSPECTION UNIT

Now YOU CAN BLOW

with the amazing new PULSATOR MODEL SAN-BLO

designed for blowing open core boxes **(wood and metal)** *without special rigging*



The Pulsator SAN-BLO is the most amazing development ever introduced for core rooms—as revolutionary as the first core blower itself. It offers an entirely new core blowing technique by which wooden core boxes can be blown as successfully as metal boxes.

This means that every foundry in the country can now take advantage of the economies of machine core blowing.

The first SAN-BLO core blower introduced the mechanized sand magazine (motor-driven plows and aerating air circuit to *move* sand to the blow hole and *carry* it into the core box) which made it possible to blow *any* core sand mixture that could be hand-rammed, and to blow cores weighing from ounces to 40 lbs. each, without changing sand magazine.

Now, with the Pulsator feature, foundries using a preponderance of open, wooden core boxes can blow cores, too. For the Pulsator does away with high air pressure in the core box, which up until now has prevented the blowing of wooden boxes. An ingenious arrangement of air valves and electronic switches makes it possible to closely control the air pressure within the core box, keeping it extremely low during the blowing cycle. The core box is filled with two, three or four short, quick blows, instead of one long blow. This holds pressure within the box close to atmospheric pressure, so that any wooden core box, assembled with nails or screws, may be blown safely and accurately. The start and stop blowing action is fast—cores are blown in a very few seconds time.

The Pulsator feature makes the SAN-BLO truly an *all-purpose* core blower. With it you can blow *all* your open core boxes—wood and metal, in their present condition, as well as closed boxes. No special rigging, no reinforcements, and in most cases, no vents, wires or rods. You can blow any core sand mixture you can hand-ram. You can blow cores weighing up to 40 lbs. each, without changing sand magazines.

All Pulsator models are convertible—turning a safety switch quickly changes operation from Pulsating to conventional core blowing for metal boxes. The standard "40" model Pulsator produces cores weighing up to 40 lbs. each. Models also available for cores up to 150 lbs. and 250 lbs. each. For information on the new Pulsator SAN-BLO, contact your local Federal representative or write us for literature, specifying your maximum core weight and dimensions.

FEDERAL

THE FEDERAL FOUNDRY SUPPLY COMPANY

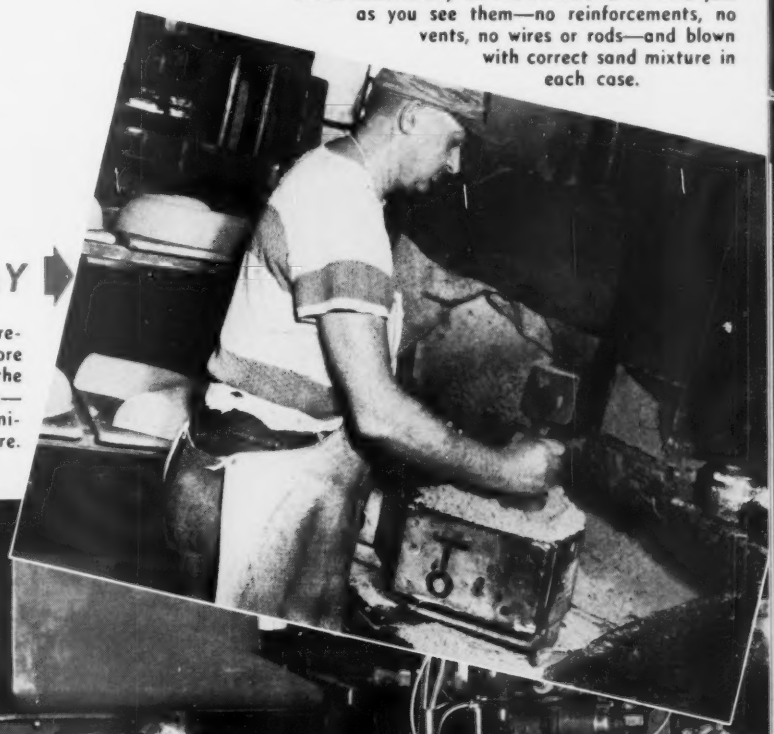
4600 EAST 71st STREET • CLEVELAND 5, OHIO

WOODEN CORE BOXES!*

* The core boxes shown here with their respective cores (and hundreds of similar wooden boxes) have been blown successfully on the Pulsator SAN-BLO just as you see them—no reinforcements, no vents, no wires or rods—and blown with correct sand mixture in each case.

THE OLD WAY

Hand-ramming a core requires from 5 to 20 or more minutes, depending on the complexity of the core box—and the core is seldom as uniform as a machine-blown core.



THE NEW WAY . . .

Here's a Pulsator SAN-BLO in operation at the Atlantic Foundry Co. of Akron, Ohio. Wooden core boxes, formerly hand-rammed, are now being blown in but a few seconds time. This is a dual control machine—one man drawing while the other is blowing a core. Boxes delivered to the machine are arranged so that when one operator is working on a hard-to-draw box, the other operator blows and draws two or three ordinary boxes. The machine never stands idle while cores are being drawn.

YORK RICHMOND, VA. CROWN HILL, W. VA. CHATTANOOGA

ROIT CHICAGO MILWAUKEE UPTON, WYO. LOS ANGELES

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

RIGHT

FOR ALL FACING SANDS
FOR ALL MOLDING METHODS
FOR ALL SIZE CASTINGS

The castings pictured here weigh from a fraction of a pound to 1750 pounds. They were produced by squeezer, jolt, and loose pattern molding methods. This unretouched photograph tells the versatile story of Hercules NVX at a glance. It proves beyond question that NVX in facing sands results in better castings—regardless of the method of molding. If you want better sand flowability for firmer, denser molds and clean, deep draws—you need NVX. We'll be glad to send you 100 lbs. of NVX for testing. Price per pound of this testing sample will be at the rate we usually quote if you were ordering in 1,000 lb. lots.

HERCULES POWDER COMPANY
INCORPORATED
Naval Stores Dept., 920 King St., Wilmington 99, Del.

NF-2-4

HERCULES®
NVX

WHEN INSTALLING THE MODERN

SCHRAMM AIR COMPRESSORS

Complete assembled SCHRAMM units are furnished with compressor and motor mounted on a substantial steel base, which can serve as a foundation. No deep pit foundation or time and expense consuming "built-up" concrete foundation is necessary.

En-Bloc construction is one of the many contributing factors to this feature in the SCHRAMM Modern Stationary Compressor. The single block casting contains all of the cylinders, the main crank shaft bearing supports, camshaft bearing supports and the complete lubricating system.

SCHRAMM Compressors are built for 24-hour continuous service, in sizes ranging from $\frac{1}{3}$ to 100 horsepower.

Write for booklet C-50B for further information.

SCHRAMM INC.

The Compressor People

WEST CHESTER • PENNSYLVANIA

SCHRAMM, INC. • WEST CHESTER, PA.

Please send Free Booklet C-50 B on installing Stationary Air Compressors.

*Name*_____

*Title*_____

*Company*_____

*Street*_____

*City*_____ *Zone*_____ *State*_____

Advertisement

ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

How CHROMIUM and TUNGSTEN Increase Strength of High-Temperature Alloys

The aircraft field has served as an important "proving ground" for the high-temperature alloys that have been developed for gas turbines required to operate at elevated temperatures. However, these alloys are now demonstrating their superior properties for other primary power applications, including gas turbines to operate electrical generators for stationary or motive power.

While there are literally dozens of different alloys available for high-temperature use, most of them contain the alloying elements chromium and tungsten for the express purpose of enhancing resistance to scaling and increasing their hardness and strength at elevated temperatures. The amount used is generally determined by the stresses and temperatures expected in service. Other alloying metals may also be added for special purposes — such as columbium, manganese, silicon, and titanium.

Chromium and Tungsten as Strength-Builders

Even small amounts of chromium and tungsten are effective in increasing the strength of high-temperature alloys. An important consideration is, of course, the exposure time—particularly when operating temperatures go above 1200 degrees Fahrenheit. Although the major role of chromium is to prevent scaling, it has been found that chromium, as well as tungsten, also helps the alloys to maintain their strength when they are exposed to high temperatures for long periods of time.

In addition to chromium and tungsten, the combination of other alloying metals present will likewise influence the strength of the alloys. Heat-treatment, too, will influence the properties of these materials. However, in obtaining the higher ranges of strength needed at extremely high temperatures, chromium and tungsten are essential.

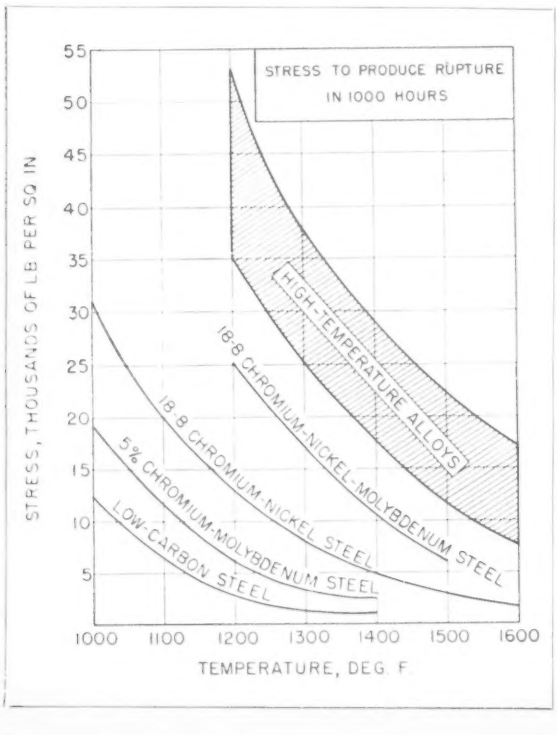


Fig. 1—Here is the average range of strength of various high-temperature alloys compared with other metals.

Where High-Temperature Alloys Are Used

Special high-temperature alloys containing chromium and tungsten are being used for the construction of gas turbines that power railroad locomotives, ships, airplanes, and electric generating plants. Some typical parts made of these alloys are rotors, turbine blades, nozzle vanes, ducts, and housings. These parts are exposed to temperatures of from 1200 to 1500 degrees Fahrenheit.

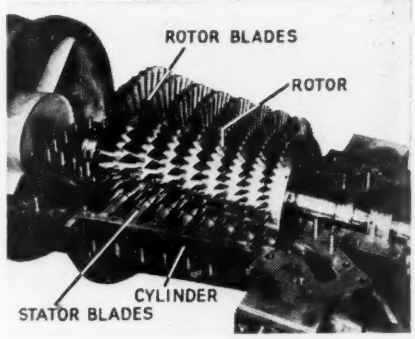


Fig. 2—Rotor and stator blades in this locomotive-type gas turbine are precision-cast of an alloy containing about 24 per cent chromium and 6 per cent tungsten. The rotor body and cylinder housing are forged from an alloy containing about 19 per cent chromium and 1.2 per cent tungsten.

If You Need Technical Help

Those producing high-temperature alloys who wish technical help in the selection of alloying metals will find ELECTROMET's metallurgists glad to cooperate. In addition to chromium and tungsten alloys, ELECTROMET also produces ferro-alloys of columbium, manganese, silicon, and titanium for use in making high-temperature alloys. If you wish further information about the properties and uses of these alloys, write to the nearest ELECTROMET office.

Ask for our booklet "Electromet Products and Service." It describes over 50 metals and alloys produced by ELECTROMET and tells of the unique technical service offered to the metal industries.

The term "Electromet" is a registered trademark of Union Carbide and Carbon Corporation.

How B&W ALLMUL cuts severe service refractory costs

LEAD DROSS FURNACE

"ALLMUL proves more economical than any refractory tried!"

A plant with several reverberatory type smelting furnaces, used to melt alloys of lead, tin and antimony, carried on an extensive investigation to obtain economical refractory linings. Practically every type of refractory was tried. Side-by-side tests in the same furnace proved the economy of B&W Allmul over all others. Result? Allmul is now standard for these furnaces.

CONTINUOUS WELD PIPE FURNACE

"Three times the life in worst wear areas!"

A large manufacturer was troubled by the short life of kyanite-base refractories in certain areas of his furnace. Then B&W Allmul were installed in the uptake arches, a critical, severe-service area. Result? Allmul lasted three times as long as previously used refractories and has been ordered for general use in all areas of this manufacturer's furnaces of this type.

INDIRECT ARC FURNACE

"All furnaces converted to ALLMUL after comparative tests"

A large company making alloy steel castings has several indirect arc furnaces melting various alloys, with pouring temperatures varying from 2700F to 3100F. With highest temperature alloys, semi-mullite brick burned out in 6 to 10 heats. B&W Allmul, which cost approximately the same, showed no appreciable wear after 20 heats. On alloy steels in general, this customer reports far-less slag formation (an indication of reduced refractory wear) with Allmul than with any other refractory used. Result: All furnaces are being relined with B&W Allmul Firebrick.

ELECTRIC FURNACE ROOF

"ALLMUL lasts 3 to 6 times as long"

In a six-ton electric furnace, handling 15 tons of stainless steel per charge, super duty firebrick had to be replaced every 20 to 40 heats. Pouring temperature of the metal was in excess of 3100F, with higher temperatures attained in the furnace during periods of oxygen introduction. The owner installed B&W Allmul Firebrick, hoping for a life of 80 heats. Allmul in the first roof lasted for 122 heats—42 more than hoped for. The second roof of Allmul went to 131 heats! Result? Further orders for Allmul.

Yes, the facts about B&W Allmul Firebrick speak for themselves. This fused-mullite brick is proving its economy in dozens of severe service applications. The reason? A unique combination of refractory properties—high hot load strength, high resistance to spalling, good volume stability, a high melting point of 3335F—all resulting in lower furnace costs. Want more data? Write for Bulletin R-29.

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST. NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

R-449

B&W REFRACTORIES PRODUCTS — B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick B&W Refractory Castables, Plastics and Mortars • OTHER B&W PRODUCTS—Stationary & Marine Boilers and Component Equipment . . . Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers . . . Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

Shattered Shot Shatters Savings

TRUSTEEL never shatters

TRU STEEL has the endurance of steel

TruSteel Shot lasts many times longer than other abrasives because it is made of tough, high-carbon steel. As a result, one pound of TruSteel cleans as much work as 3 to 6 pounds of iron abrasives that shatter.

TRU STEEL has a full heat treatment

To make TruSteel even tougher, it is fully heat-treated, not just drawn or annealed. This is another reason why it never shatters, why you have less abrasive to buy, ship and store when you use TruSteel.

TRU STEEL costs less to use

Other premium abrasives claim savings, too, but comparative tests prove TruSteel's superiority. For example, the results of a typical test made by a prominent manufacturer show the following cost per hour:

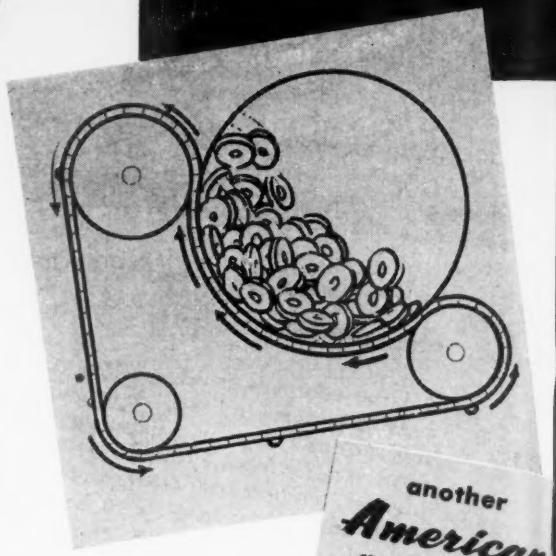
Abrasive "A"	$ .67	Abrasive "B"	$ .978
Abrasive "C"	$1.33	TruSteel	$ .467

Until you've tried TruSteel, you can't be sure the abrasive you are using is giving you maximum life at the lowest cost.

Bulletin 59-A shows how savings can be made by using TruSteel Shot in your plant. Send for your copy today.

manufactured by Steel Shot Producers, Inc.

Why



another American first in design and development

Complete Exposure of Work

The endless belt tumbling method completely exposes all surfaces of every piece to the abrasive blast.

Send for this 20 page TUMBLAST CATALOG

Catalog No. 254-A is a comprehensive guide to airless batch mill cleaning. It describes the advantages of the Tumblast and illustrates the 8 standard sizes as well as the Continuous Automatic Tumblast. Send for your copy today.

THE AMERICAN MOLDER

American WHEELABRATOR Inc.

505 S. Byrkit St.

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST CLE

more foundries use Wheelabrator TUMBLASTS® than any other type of blast cleaning machine

PROVEN DESIGN—for cleaning more castings at lower cost

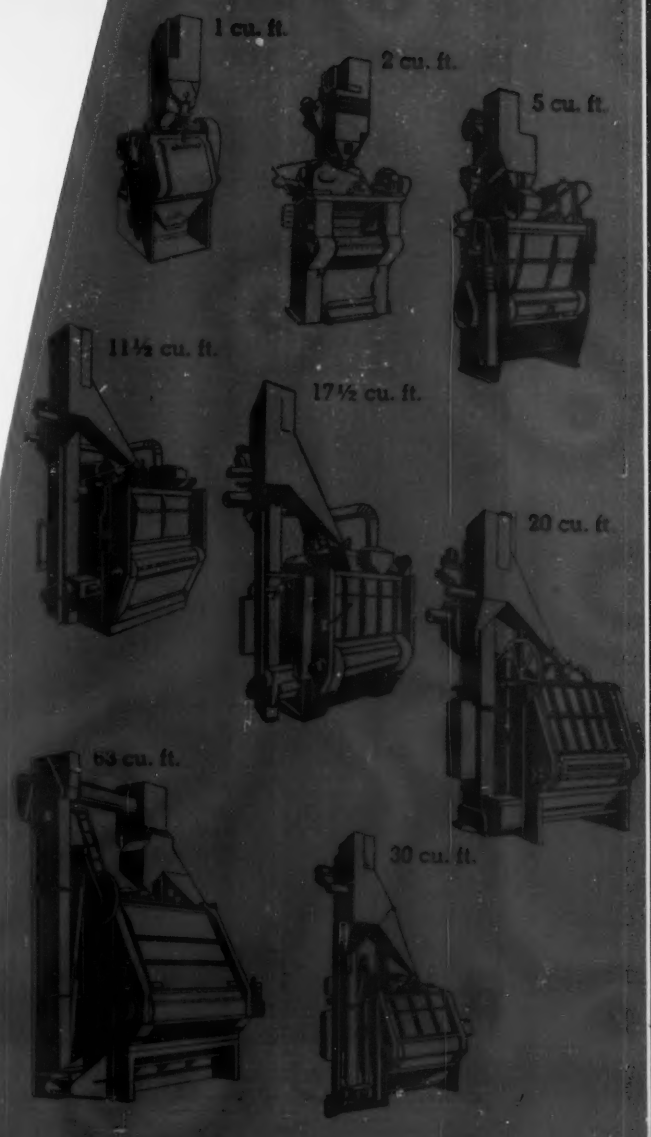
The high speeds and low cost at which the Wheelabrator Tumblast cleans large quantities of parts have won for it the stamp of approval of 4350 enthusiastic users. For many years, its exclusive design features have been paying important dividends to these users through cost savings effected by reducing manpower, breakage, power, and maintenance . . . by improving cleaning quality and inspection . . . by speeding up subsequent machining and grinding and by lengthening cutting tool life.

ENDLESS CONVEYOR TUMBLING for complete exposure of work

The design of the Tumblast Barrel gives a tumbling action which exposes ALL surfaces of EVERY casting to the full abrasive blast, eliminating the possibility of any "dead" areas in the cleaning chamber. The combined action of tumbling and the Wheelabrator provide the fastest cleaning obtainable.

8 MACHINE SIZES for a closer fit of your cleaning problems

The extensiveness of the Tumblast line makes it possible to select a machine that is just right to fit your needs. You are not penalized with equipment that is too large or too small. You are assured of the highest possible cleaning efficiency that can only be obtained when you have the right size machine for your job.

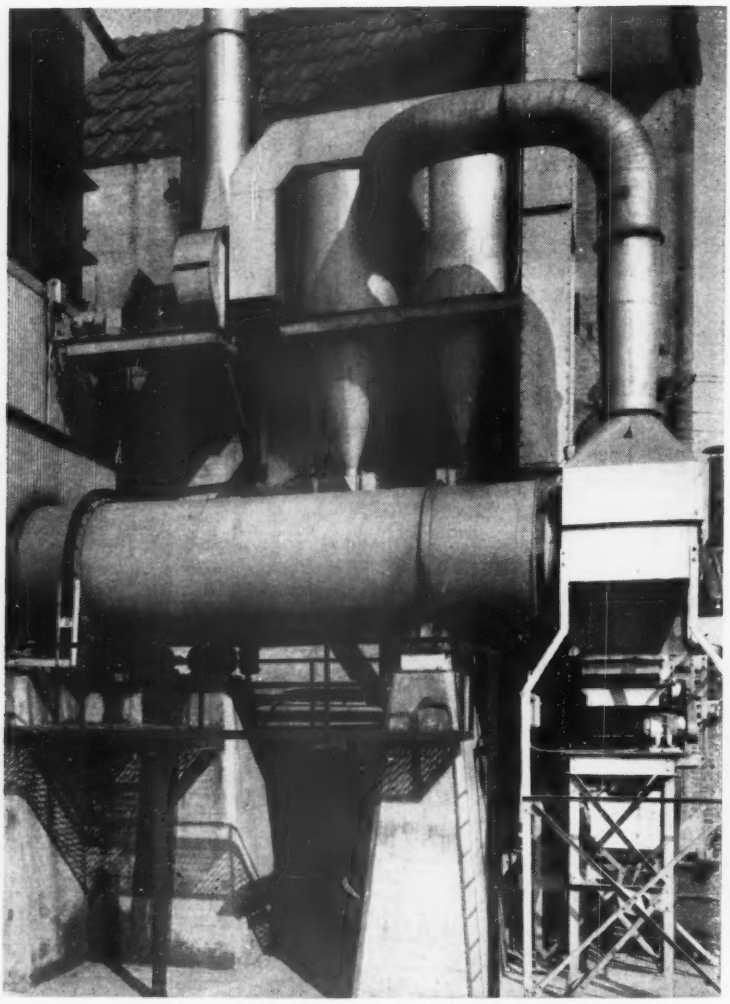


EQUIPMENT CORP.
Mishawaka, Indiana
CLEANING EQUIPMENT

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Gentle rolling action over slowly revolving louvres results in uniform treatment, thereby eliminating spotty over- or under-drying. Gradual drying of sand, as it progresses through the Roto-Louvre Dryer, affords a uniform moisture content of the product at a low final temperature.

Dry sand means better castings



At a Detroit automotive foundry, Link-Belt Roto-Louvre Dryer reduces moisture content of 10 tons of sand per hour from 6.0% to 0.5%.

Space-saving LINK-BELT Roto-Louvre Dryer delivers large volumes of dry sand... at cool discharge temperatures

For uniform mixing, core and molding sands must be dry. And the sand must also be cool enough to blend properly with core oil. On both counts, Link-Belt Roto-Louvre Dryers offer unique advantages.

Sand is delivered with a uniform moisture content of 0.5% and at a uniformly low discharge temperature. Equally important, Roto-Louvre does this without the assistance of an extra cooler . . . requires only half as much floor space as other drying equipment.

Link-Belt builds eight sizes of Roto-Louvre Dryers—in capacities from 1 to 60 tons per hour. Get complete information from the Link-Belt office near you, or write direct for new Book 1911-B.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

LINK-BELT

HANDLING and SAND PREPARATION MACHINERY

LINK-BELT COMPANY Plants: Chicago, Indianapolis, Philadelphia, Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 12/49

Simple Solution

to a Purchasing Problem—

ORTAC hose that answers most of your needs!

THERE'S a simple answer to hose purchasing problems—Goodyear's ORTAC *(Oil Resistant Tube and Cover)*. For this ONE construction was designed by the G.T.M.—Goodyear Technical Man—to handle MANY jobs.

ORTAC will withstand gasoline, fuel oils and distillates. It resists attack from solvents. Contaminants found in water don't harm it. ORTAC is excellent too for air and spray service. Its cover resists sun, weather and wear—and ORTAC has a tube that won't flake, swell or discolor.

Ask your nearest distributor for the full story of ORTAC—or write Goodyear, Akron 16, Ohio.

LOOK FOR YOUR GOODYEAR INDUSTRIAL RUBBER PRODUCTS DISTRIBUTOR *in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods." He handles Hose, Flat Belts, V-Belts, Molded Goods, Packing, Tank Lining, Rubber-Covered Rolls built to the world's highest standard of quality.*

GOODYEAR

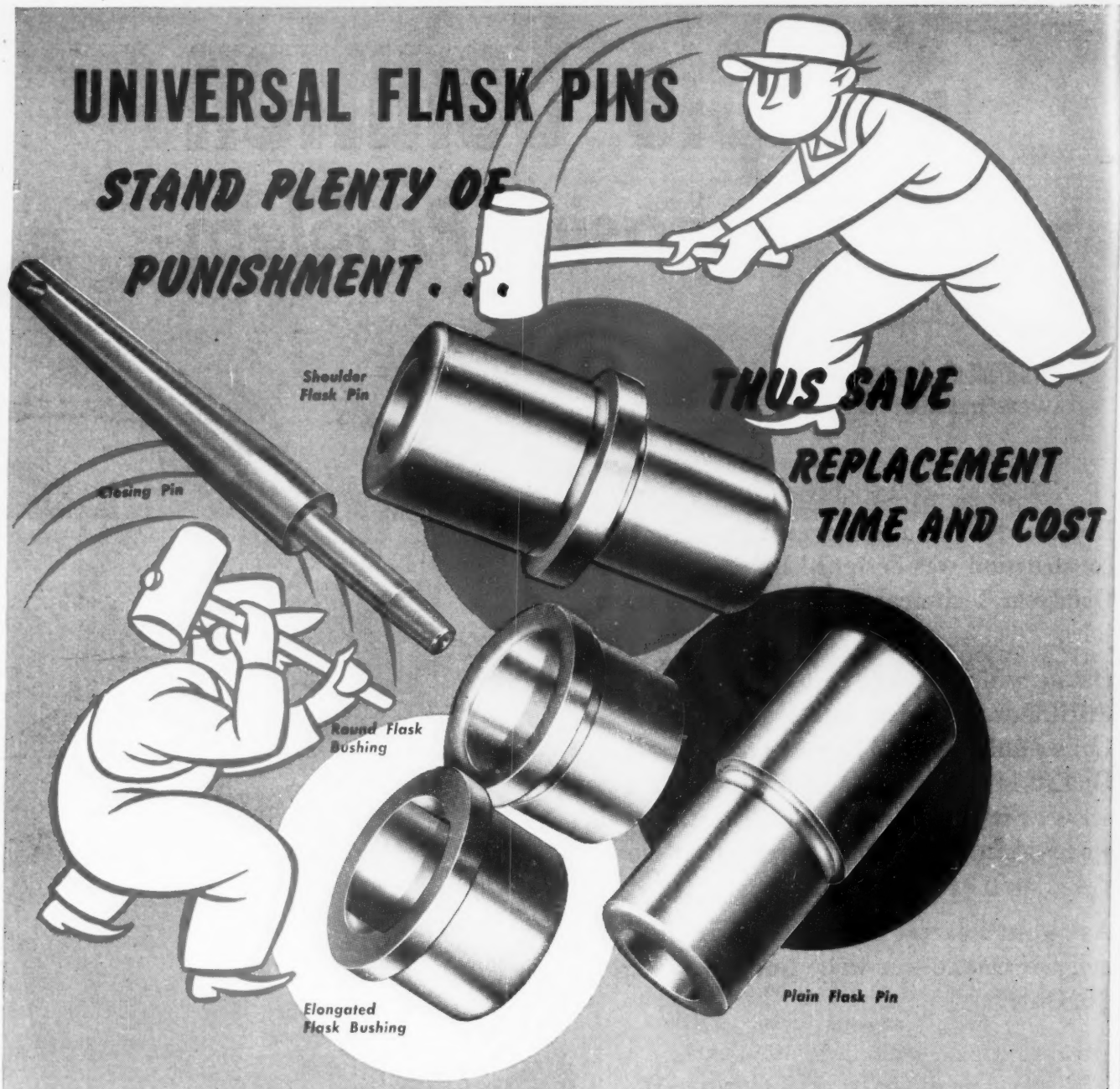
THE GREATEST NAME IN RUBBER

Ortac—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

UNIVERSAL FLASK PINS

STAND PLENTY OF PUNISHMENT . . .

THUS SAVE REPLACEMENT TIME AND COST



Universal Flask Pins and Bushings are made to really stand up no matter how much punishment they're given in the foundry. They seldom break or bend—in spite of the beating they take on the shake-out. The bushings show a minimum of wear despite continuous use.

The reason: Universal Flask Pins and Bushings are heat-treated and precision ground from high quality steel with the same close tolerances found in machine tool work. Because they stand up, Universal Bushings and Pins save the cost and the down-time that replacement always requires. Because of their precise design and construction, Universal Bushings and Pins allow perfect cope and drag alignment. And because all standard sizes are carried in stock you get prompt delivery. Special sizes and types to order. Complete information is available by requesting the Universal Catalog covering Flask Pins and Bushings. Direct your inquiries and orders to the office nearest you —1060 Broad St., Newark, N. J., and 5035 Sixth Ave., Kenosha, Wisconsin—or write to our home office.

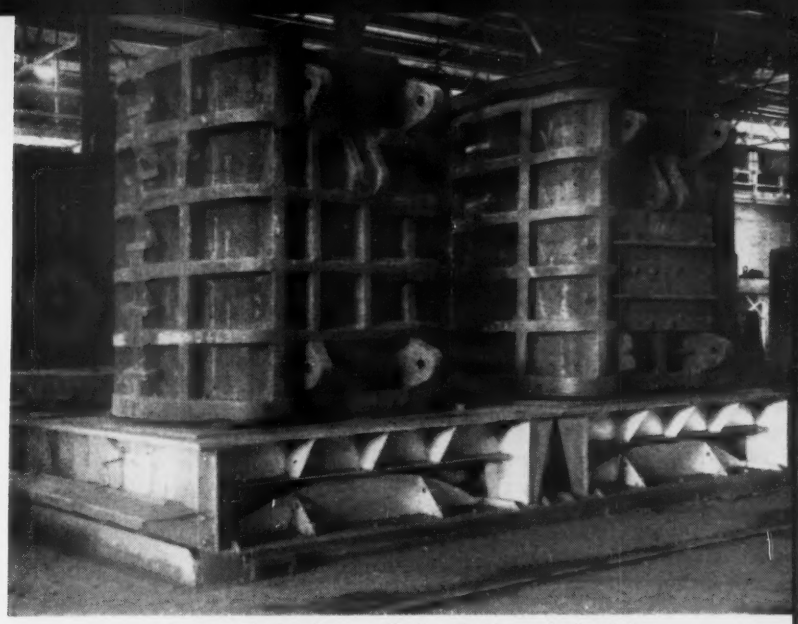
UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 4, MICHIGAN

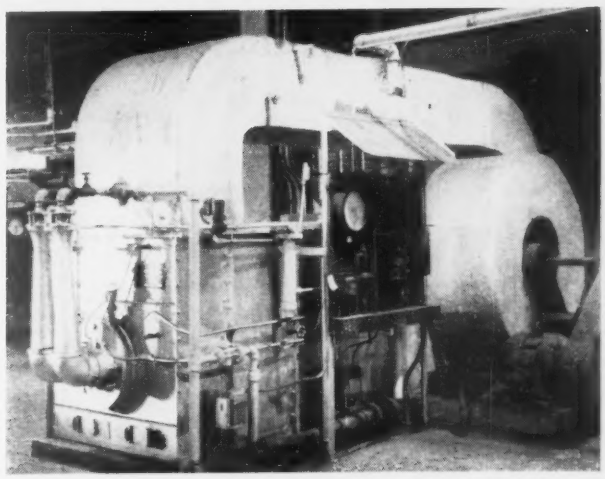
ANOTHER GREAT ACHIEVEMENT BY

CARL-MAYER!

INGOT MOLD DRYING *Equipment*



Ingot molds in place on Heating Bench, ready for drying.



One of a battery of 4,000,000 Btu gas-fired recirculating air heaters, showing burners, controls and safety devices, heat delivery fan and return ducts.

SPEEDS UP PRODUCTION AS MUCH AS 100%

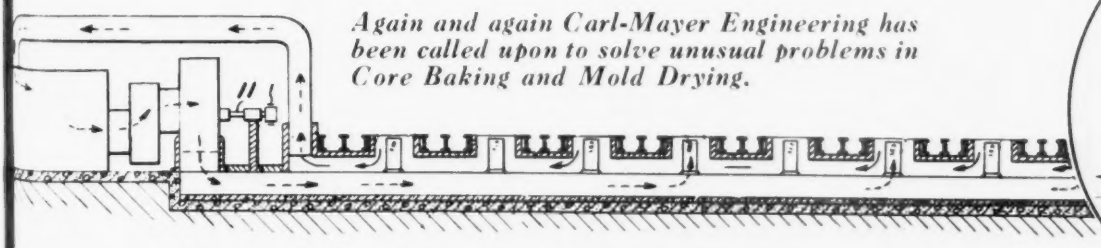
A user reports doing this with equipment designed by Carl-Mayer.

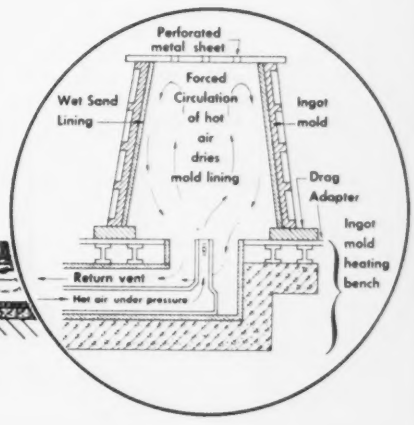
This patented system eliminates costly oven casing by letting the mold be its own oven.

The molds, open at both ends, lined with green sand, are placed on a special Ingot Mold Heating bench.

The gas-fired heater system forces hot air through nozzles under the molds. A perforated metal plate placed on top of the mold holds in most of the heated air which bakes the lining and returns through ducts to the heating and pump unit. Placing and removing molds are readily done by overhead cranes.

Again and again Carl-Mayer Engineering has been called upon to solve unusual problems in Core Baking and Mold Drying.





Schematic diagram shows how mold lining is cured.

Patent No. 2,509,396

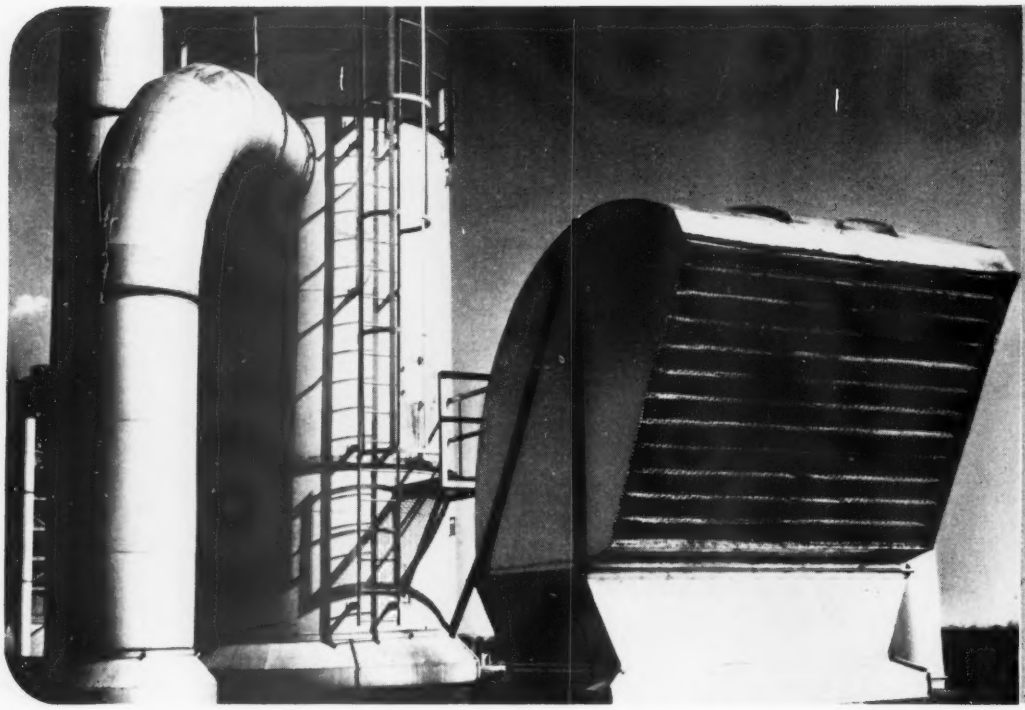
THE CARL-MAYER CORPORATION

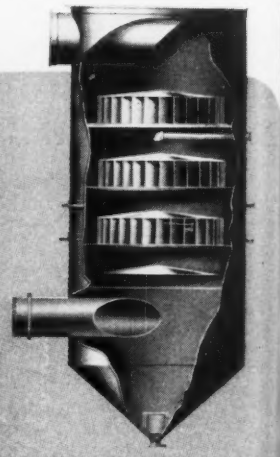
3030 Euclid Avenue • Cleveland, Ohio

CORE AND MOLD OVENS, also other types of Industrial Ovens and Furnaces

Over Thirty Years' Experience

INDEPENDENT LABORATORY TESTS FIND MULTI-WASH DUST COLLECTOR SYSTEM 99.9% Efficient





Model JC Collector — For most shakeouts and sand preparation systems. Model IC Collector—For hot or dry shakeouts and most cleaning room applications. Model HC Collector—For highest collecting efficiency of extremely fine materials. *All models are made in ranges from 1000-36,000 c.f.m.*

A recent Schneible Multi-Wash installation in a nationally known foundry, has been job-tested by a prominent laboratory The findings—99.9% efficient on overall normal operation.

This test was conducted to determine the efficiency of dust removal by weight and by count in four particle size ranges, 15 to 30 microns, 5 to 15 microns, 2 to 5 microns and under 2 microns with a type IC Multi-Wash Collector having 4½ impingement stages. During sampling it was handling 33,620 c.f.m under normal foundry production.

These tests, based on a number of dust particles showed an efficiency of 99.9%. Based on weight efficiency the percentage was even higher. The chemical analysis was based on dehydrated samples which were so small on the amount remaining from the discharge that actual silica or other analysis could not be made.

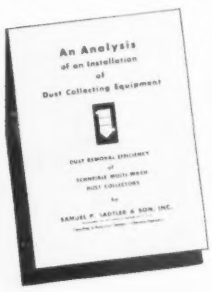
If you are considering any dust collecting system you can't find a more highly efficient system than Multi-Wash. *Write for your free copy of the complete analysis of the above installation* and *see how you, too, can benefit with Multi-Wash.*

CLAUDE B. SCHNEIBLE CO.

P. O. BOX 81, NORTH END STATION
DETROIT 2, MICHIGAN

Free

Write for your copy today



PRODUCTS:

Multi-Wash Collectors • Uni-Flo Standard Hoods • Uni-Flo Compensating Hoods • Uni-Flo Fractionating Hoods • Water Curtain Cupola Collectors • Ductwork • Velocitrap • Dust Separators • Entrainment Separators • Settling and Dewatering Tanks • "Wear Proof" Centrifugal Slurry Pumps

SCHNEIBLE

Late Foundry News

JULY 24, 1952

STRIKE HURT: The late steel strike affected foundries both directly and indirectly. With many casting consumers unable to obtain steel, their requirements of castings to be incorporated in manufactured products naturally have been curtailed, if not closed off completely. Shutting off the supply of pig iron from blast furnaces was of little consequences early in the strike because most foundries had ample stocks. With consumption declining, shortages still are the exception, although some foundries in the Detroit district have been turning to Canadian iron, paying a substantial premium over the domestic price. Cast scrap supplies appear ample, with prices somewhat firmer. NPA shortly will cut the maximum inventory limit of pig iron consumers from 60 days' supply to 30 days, it is understood.

ARMOR CASTINGS: Increases in contracts for the Army's newly designed T-48 medium tank assures heavy demand from that direction for steel armor castings. One prime contractor indicates that limited capacity for the extremely large castings used in the one-piece hull and one-piece turret of this unit may require a redesign of the hull into a number of separate castings and use of rolled armor. Bottleneck in small armor steel castings for tank use has generally been broken, a factor being reduced requirements for freight car castings.

AGREE ON STANDARDS: U. S., Canadian and British technicians are forming a permanent organization to work on unification of engineering standards. Standardization will affect all major items, including drafting standards and practices —a subject which caused considerable difficulty during World War II. Other items to be standardized are screw threads, fits and tolerances.

FOUNDRY EXPANSION: As of June 20, pending applications for rapid tax amortization of new or expanded foundry facilities involved a proposed investment of about $18,500,000, according to the Defense Production Administration. These covered 66 individual plants. As of the same date DPA had approved certificates representing total expenditures by foundries of more than $108 million for nearly 300 plants. Tax amortization was allowed on about 65 per cent of this amount. The total of new construction is made up of $40,296,000 for gray iron, $13,488,000 for malleable, $37,834,000 for steel and $16,740,000 for nonferrous.

NEW CERTIFICATES: Foundry interests for whom certificates of necessity were approved recently, and amounts certified, include: City Pattern Foundry & Machine Co., Detroit, $45,131; Magnesium Alloy Products Co., Los Angeles, $40,250; R. Hoe & Co. Inc., Dunellen, N. J., $57,817; Frontier Bronze Corp., Niagara Falls, N. Y., $12,260; Westinghouse Electric Corp., Trafford, Pa., $669,500; Ridge Tool Co., New Philadelphia, O., $540,546; Acme Aluminum Foundry Co., Chicago, $47,375; Hansell-Elcock Co., Chicago, $342,011; Lakey Foundry & Machine Co., Muskegon, Mich., $240,400.

ARTIFICIAL GRAPHITE: A safe balance exists between supply and demand among artificial graphite products and carbon electrodes; consequently, allocation controls should be removed or revised, according to the industry's advisory committee to NPA. Production capacity is expected to be expanded to 176,000 tons by July 1, 1954, an increase of 74 per cent in 3½ years.

ALUMINUM STOCKPILE: DPA plans to replenish the aluminum stockpile with 15,500 tons of the metal in the fourth quarter. It is intended to replace metal withdrawn in the fourth quarter last year and the first quarter of 1952.

SDPA OFFICE: A regional office of the Small Defense Plants Administration has been opened at 1101 Euclid Ave., Cleveland. Principal function is to provide "one-stop" service to small firms needing assistance in the fields of contract and materials procurement, loans and credit.

INVENTORY RESTRICTIONS: Suspension of NPA inventory restrictions on copper and aluminum is only for the duration of the steel strike. It will be rescinded once effect of the strike is overcome. Former inventory limits, based on number of days of working supply were 60 for copper and 45 for aluminum. Quarterly allotments of the metals are expected to provide a check against hoarding.

MORE COKE CAPACITY: Seventeen coke and coal chemical projects, totaling more than $100 million, were certified for rapid tax amortization from Mar. 1 through May 31. The new facilities, to be located in nine different states, will provide annual production capacity of about 6,640,000 tons of coke.

NICKEL ALLOY SCRAP: A change in the OPS price regulation for iron and steel scrap permits charging a premium for such scrap having a nickel content between 0.5 per cent and 1 per cent and between 5.25 per cent and 7 per cent. These ranges are in addition to the existing range of 1 per cent to 5.25 per cent. Changes in ranges are intended to encourage segregation and reclamation of nickel-bearing scrap.

FEWER INJURIES: U. S. Department of Labor reports the first quarter had the lowest average injury-frequency rate for manufacturing indus-

tries since the fourth quarter of 1949. Average for 127 industry classifications was 13.5 injuries per million man-hours worked. Rate for gray iron and malleable foundries was 29.6, against 31.8 the preceding quarter. Among steel foundries the rate dropped from 29.8 to 27.6 and in nonferrous foundries from 24.8 to 23.5.

APPRENTICE DEFERMENTS: While apprentices needed for military and essential civilian production now may be granted deferment from selective service, the recently signed order making this possible does not permit permanent exemption. One of the conditions of the order is that the apprentice's training program meet the standards and requirements prescribed by the director of selective service, based upon the recommendations of the secretary of labor.

PERSONALS: Harvey T. Harrison, executive vice president, the Duraloy Co., Scottdale, Pa., was re-elected president of the Alloy Casting Institute. New vice president is G. A. Baker, vice president, the Duriron Co., Dayton, O. . . . Arnold Lenz, 64, vice president of General Motors Corp. and general manager, Pontiac Motor Division, was killed in an automobile-train collision July 13 near Lapeer, Mich. . . Edward H. Platz Jr., alloy sales manager, Lebanon Steel Foundry, Lebanon, Pa., has been assigned to the Nickel Section, Ferroalloys Branch, NPA, Washington . . . Walter H. Wiewel, sales vice president, Crucible Steel Co. of America, has been succeeded as assistant administrator of the NPA in charge of the Metals and Minerals Bureau by William M. Day, vice president and general manager, Michigan Bell Telephone Co.

MISCELLANY: Kaiser Aluminum & Chemical Corp. has started its eighth potline at its Mead, Wash., primary aluminum reduction plant. This increased the annual capacity to 175,000 tons, largest in the country . . . Newest DPA agency is the Post-Attack Production Staff. It is intended to co-ordinate all DPA activities in connection with industry rehabilitation after enemy attack, also with industrial dispersion prior to attack . . . A Bureau of Labor Statistics survey shows that steel foundry workers had average straight time earnings of $1.63 an hour in December, 1951. This was slightly below earnings in nonferrous foundries but above that of gray iron and malleable foundry workers . . . The RFC, under the Small Defense Plants Administration program, has granted a loan of $49,500 to the Dixie Foundry Products Co., Memphis, Tenn.

PRICES OF FOUNDRY METALS AND COKE

(As of July 24, 1952)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE

Connellsville	$17.00-18.00
New River	21.30
Wise County	15.95

OVEN

Birmingham	$20.30
Chicago	23.00
Detroit	24.00
Erie, Pa.	23.50
Everett, Mass.	24.50
Indianapolis	22.75
Kearney, N. J.	22.75
Milwaukee	23.75
Painesville, O.	24.00
Philadelphia	22.70
Neville Island (Pittsburgh)	23.00
Portsmouth, O.	22.50
St. Louis (delivered)	25.40
Swedeland, Pa.	22.60
Terre Haute, Ind.	22.50

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$54.50	$55.00
Birmingham	48.88	....
Buffalo	52.50	53.00
Chicago	52.50	52.50
Cleveland	52.50	52.50
Everett, Mass.	57.50	58.00
Fontana, Calif.	58.50	....
Geneva, Utah	52.50	....
Granite City, Ill.	54.50	54.90
Lone Star, Tex.	48.50	48.50
Neville Island (Pittsburgh)	52.50	52.50
Steelton, Pa.	54.50	55.00
Swedeland, Pa.	56.50	57.00
Toledo, O.	52.50	52.50
Troy, N. Y.	54.50	55.00
Youngstown, O.	52.50	52.50

NONFERROUS INGOT

BRASS AND BRONZE: 85-5-5-5—27.25c; 88-10-2—40.00c; 80-10-10 — 33.00c; No. 1 yellow — 23.25c.

ALUMINUM: 99 per cent plus, primary ingots 19.00c. Secondary No. 12 alloy 19.50c Deoxidizing grades: No. 1 18.80c; No. 4 18.20c.

MAGNESIUM: 99.8 per cent standard ingots 24.50c, f.o.b. Freeport, Tex.

COPPER: Electrolytic 24.50c, Connecticut valley; Lake 24.61½c, delivered.

Zinc: High grade 16.35c, delivered. Die casting alloy 19.50c, delivered.

IRON AND STEEL SCRAP

(Ceiling prices per gross ton as established by the Office of Price Stabilization)

	*No. 1 Bundles	Cast Steel	**Steel, 2 ft & less	Punchings, Plate Scrap	Cast Iron Briquets
Birmingham	$39.00	$44.00	$39.00	$41.50	$39.00
Buffalo	43.00	48.00	43.00	45.50	43.00
Chicago	42.50	47.50	42.50	45.00	42.50
Cincinnati	43.00	48.00	43.00	45.50	43.00
Cleveland	43.00	48.00	43.00	45.50	43.00
Detroit	41.15	46.15	41.15	43.65	41.15
Eastern Pa.	42.50	47.50	42.50	45.00	42.50
Los Angeles	35.00	40.00	35.00	37.50	35.00
Pittsburgh	44.00	49.00	44.00	46.50	44.00
San Francisco	35.00	39.00	35.00	37.50	35.00
St. Louis	41.00	46.00	41.00	43.50	41.00
Seattle	35.00	40.00	35.00	37.50	35.00

Above delivered prices are ceiling levels at basing points indicated. * Applies to dealer and industrial scrap; No. 1 and No. 2 heavy melting steel are $1 less; No. 1 railroad heavy melting is $2 higher. **$2 higher if 1 ft or under.

CAST IRON SCRAP

No. 1 cupola cast	$49.00
Heavy breakable cast	45.00
Burnt cast iron	41.00
Cast iron brake shoes	41.00
Stove plate	46.00
Clean auto cast	52.00
Unstripped motor blocks	43.00
Iron wheels, No. 1	47.00
Malleable	55.00
Drop broken machinery cast	52.00

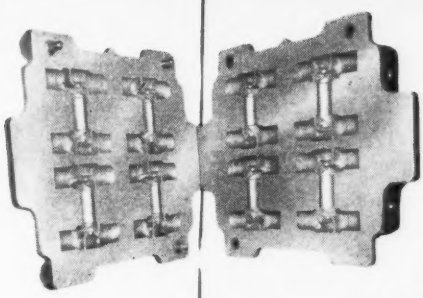
Above ceiling prices, per gross ton, are f.o.b. shipping point. Add transportation charges to obtain delivered prices at any foundry.

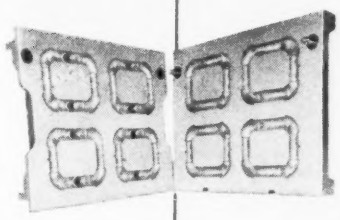
Plan!..Your High Production Core Jobs with . . .

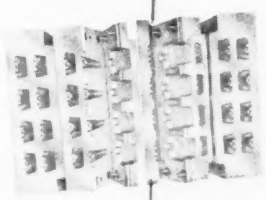
DUPLICAST

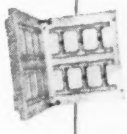
TRADE MARK REGISTERED

"The Expendable Core Box"









Let Industrial's "Corelating Engineers" Assist You in Taking Full Advantage of Duplicast's Features —

With the increased recognition of Duplicast as the ideal core box for high production schedules and for complicated, irregular shapes and cavities which otherwise are costly to replace or to repair—more foundrymen have become aware of the value of Industrial's "Corelating" Engineering Service in the initial planning of their jobs. The experience of our engineers in all types of high production core manufacturing equipment has enabled them to make valuable suggestions in the designing and manufacturing of cores, core boxes and dryers. Their assistance has paid dividends in the saving of time, effort and money on many jobs — through carefully engineered planning. Our "Corelating" Engineers will be pleased to work with you to get full value from **all** the great advantages offered by Duplicast. Call us when you are in the planning stage of your next high production core job and let us serve you with our full facilities.

DUPLICAST OFFERS 6 PROFITABLE ADVANTAGES TO YOU

1. ***Duplicast saves you up to 80% on core box replacement costs.***
2. ***Extra Duplicast core boxes are on hand at all times — no production delays.***
3. ***No sampling or checking is necessary when a new Duplicast core box is put into production.***
4. ***Duplicast means a substantial reduction in scrap.***
5. ***There is an increase in core production over cast iron boxes formerly used.***
6. ***Duplicast offers its "Corelating" Engineering Service to help you plan the job for greater profit.***

*Duplicast core boxes are made of a wear resistant aluminum alloy by a patented method in which a permanent hob, or mandrel, is used to duplicate any number of core boxes of exact dimensions within plus or minus .003 inches within a distance of 12 inches. Every Duplicast core box is produced with a mirror-like finish in the cavities without hand finishing or tooling of any kind.

"New Methods in Pattern Making"

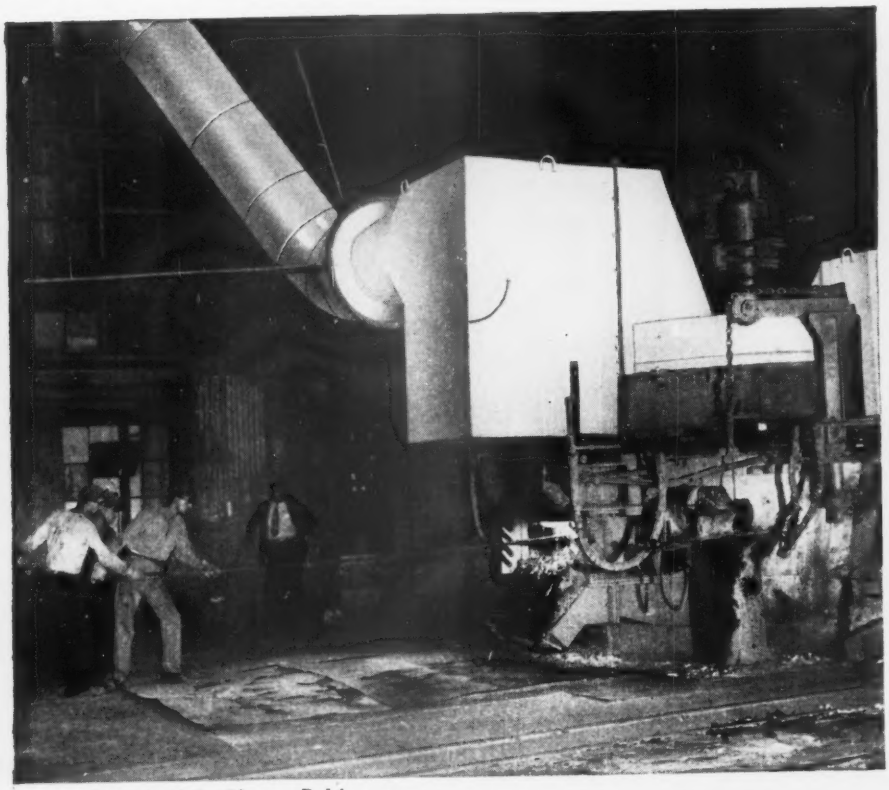
Unusual interest and discussion has resulted from the talk entitled "New Methods in Pattern Making" given at the International Foundry Congress by Harry J. Jacobson, President, Industrial Pattern Works.

Printed copies of this talk are now available at no charge. Just send a post card.

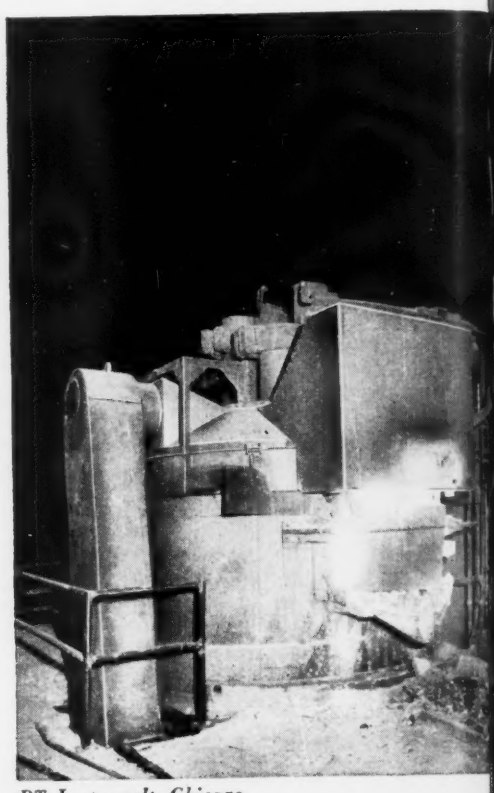
INDUSTRIAL PATTERN WORKS

2625 West Belmont Avenue · Chicago 18, Illinois

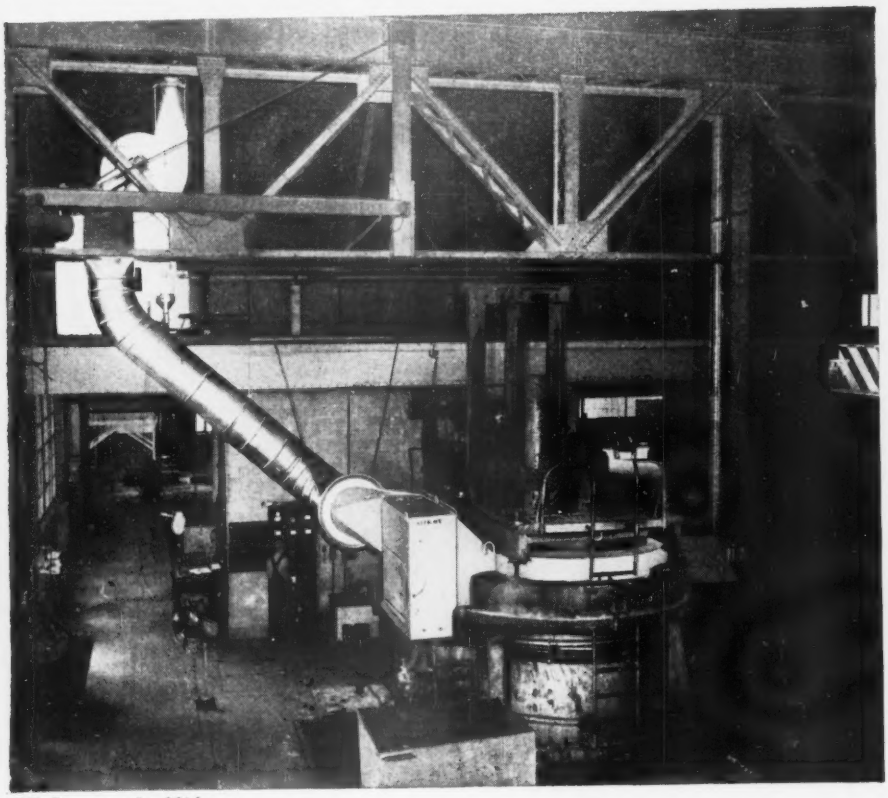
winter foundry strategy calls fo



12 Ton Heroult, Side Charge, Baltimore



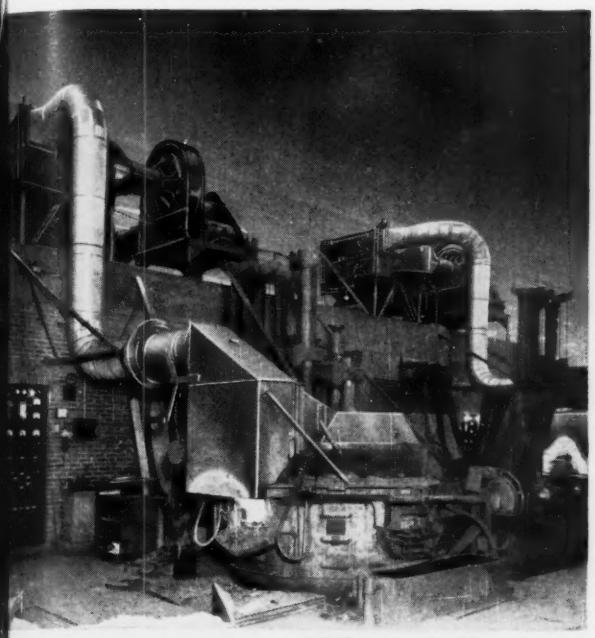
PT Lectromelt, Chicago



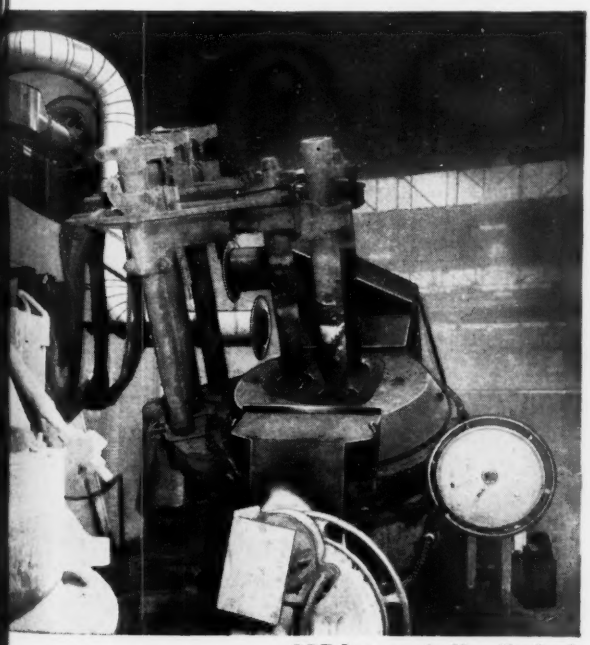
OT Lectromelt, Midwest

Q Lectromelt, Missouri

s for furnace fume control!



PT Lectromelt, Massachusetts



OPT Lectromelt, New England

Order AAF furnace hood and **ROTO-CLONE** combination, now for clean foundry air next winter

THE PATENTED AAF Furnace Hood in combination with AAF Type N ROTO-CLONE* hydro-static dust collector, furnishes the answer to the problem of effective ventilation in winter "air-locked" electric melting furnace foundries.

The AAF Hood is applicable to either top or side charge furnaces of all makes and sizes. The specially designed circular hood is attached to the furnace roof ring and permits full operation without hindrance. It picks up Fumes and Dust at their source and thereby completely ventilates the foundry with the minimum movement of air and use of power.

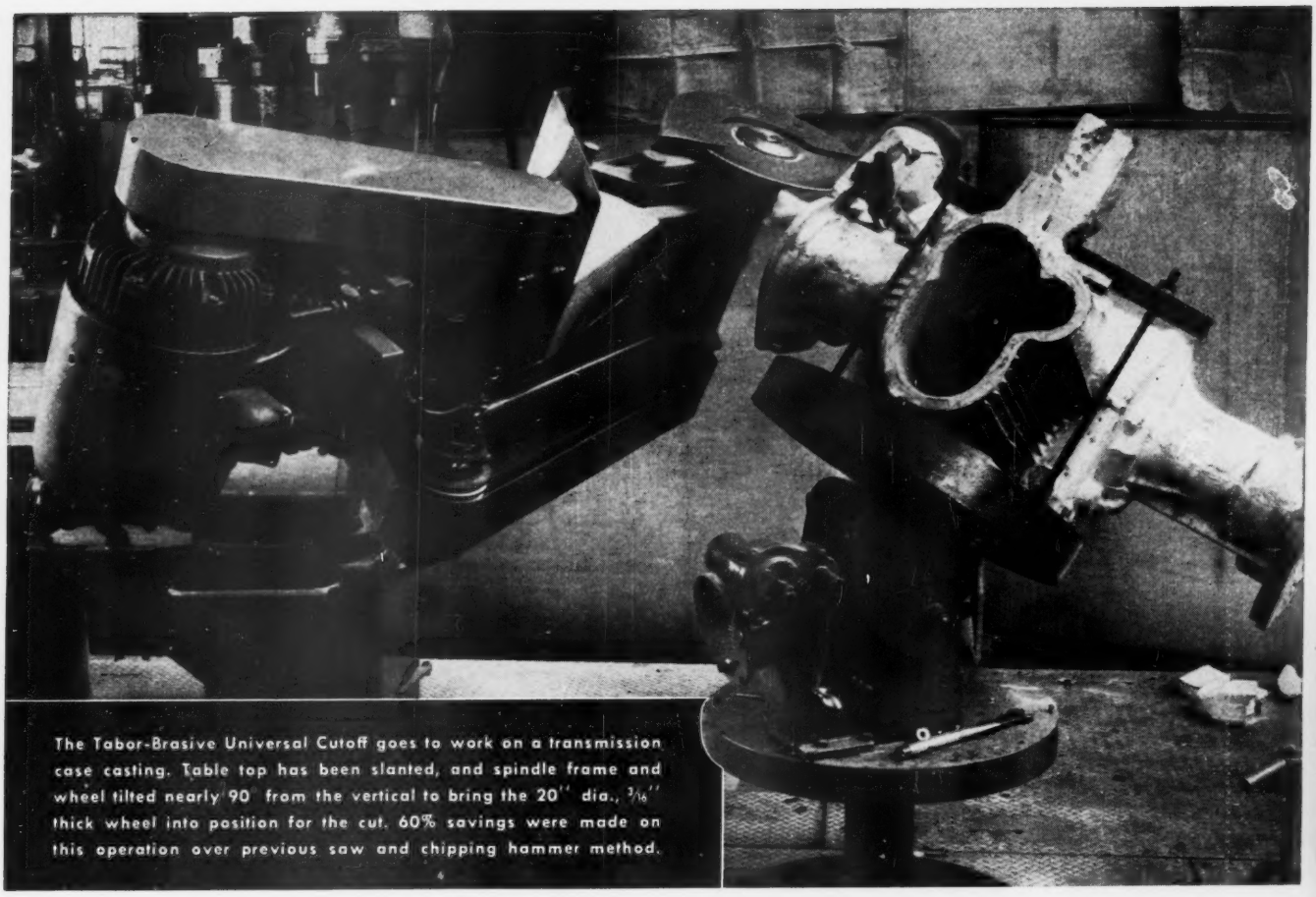
The AAF Type N ROTO-CLONE is the ideal exhaust unit. Being a wet-type collector it cools and contracts the hot gases during the boil and refining period, thus maintaining a uniform in-flow of fresh air during the complete furnace cycle.

This AAF combination is a *must* for winter operation of Electric Furnace Foundries. Now is the time to order equipment for next winter. Call your nearby AAF representative or write direct to us.

**ROTO-CLONE is the trade-mark (Reg. U.S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

American Air Filter
COMPANY, INC.

266 Central Avenue, Louisville 8, Ky.
American Air Filter of Canada, Ltd., Montreal, P. Q. • Pacific Division Office, San Francisco, California



The Tabor-Brasive Universal Cutoff goes to work on a transmission case casting. Table top has been slanted, and spindle frame and wheel tilted nearly 90° from the vertical to bring the 20" dia., 3/16" thick wheel into position for the cut. 60% savings were made on this operation over previous saw and chipping hammer method.

We have abrasive cutoff machines in our blood!

How else could our staff design and build the machine shown—a giant that does almost the impossible.

It cuts gates, fins, and risers at just about any angle, from almost any shape of casting, within a 220-square foot working floor area.

"Flexibility," you ask? The main column moves back and forth. The arm swings completely around the column. The spindle frame swings 270° around the end of the arm and rotates 90° either way from vertical. The cutting table handles castings weighing up to 500 pounds. Table unit raises and lowers hydraulically and rotates 360° on its vertical axis. Table top also rotates about its center and tilts 90°. As many as four tables can be incorporated in the unit. Except for the chopping or cutting action, all movements are electrically controlled and spring-locked.

Such an example of design skill serves to reaffirm that Tabor is a good place to go for abrasive cutoff machines. Our standard line covers foundry and metalworking units—from 3 H.P. on up. Complete bulletins and data for the asking.

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; Harry H. Reich, Trussville, Ala.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The TABOR Manufacturing Co.

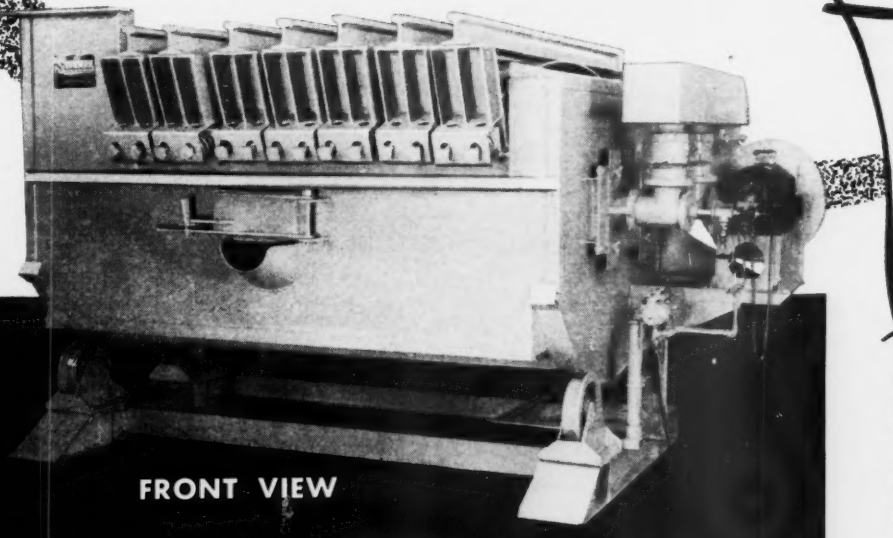
SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

THEY'RE CUT OUT...TO CUTOFF!

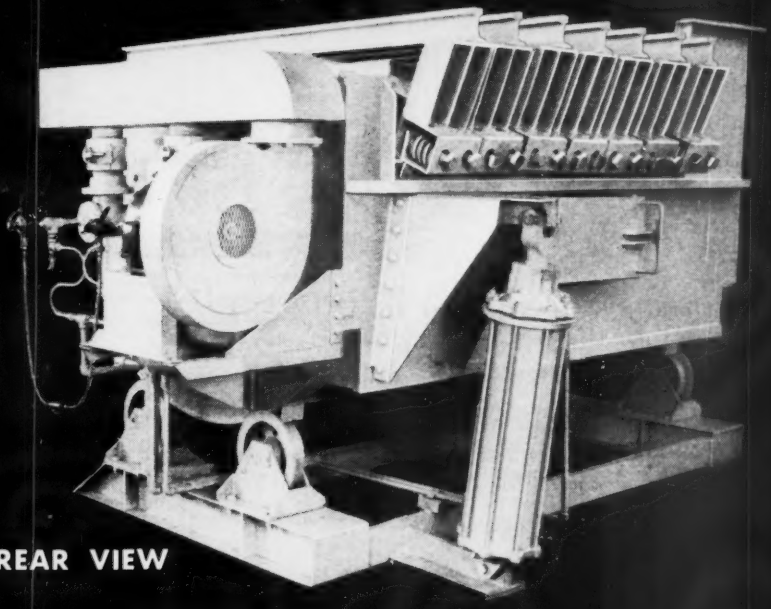
EXPORT DEPARTMENT, 765 DREXEL BLDG., PHILA. 6, PA.

Another NEW STROMAN REVERBERATORY FURNACE FOR COPPER ALLOYS or IRON!

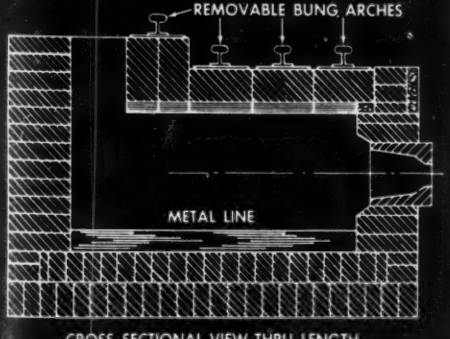
The Most Economical Furnace Ever Made to Handle Capacities from 400 to 10,000 pounds per heat.



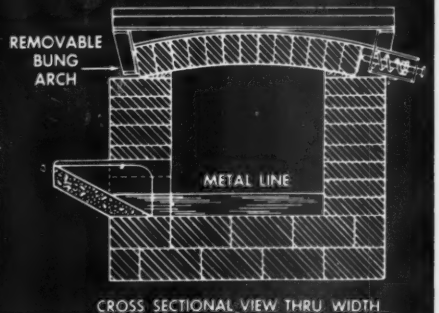
FRONT VIEW



REAR VIEW



CROSS SECTIONAL VIEW THRU LENGTH



CROSS SECTIONAL VIEW THRU WIDTH

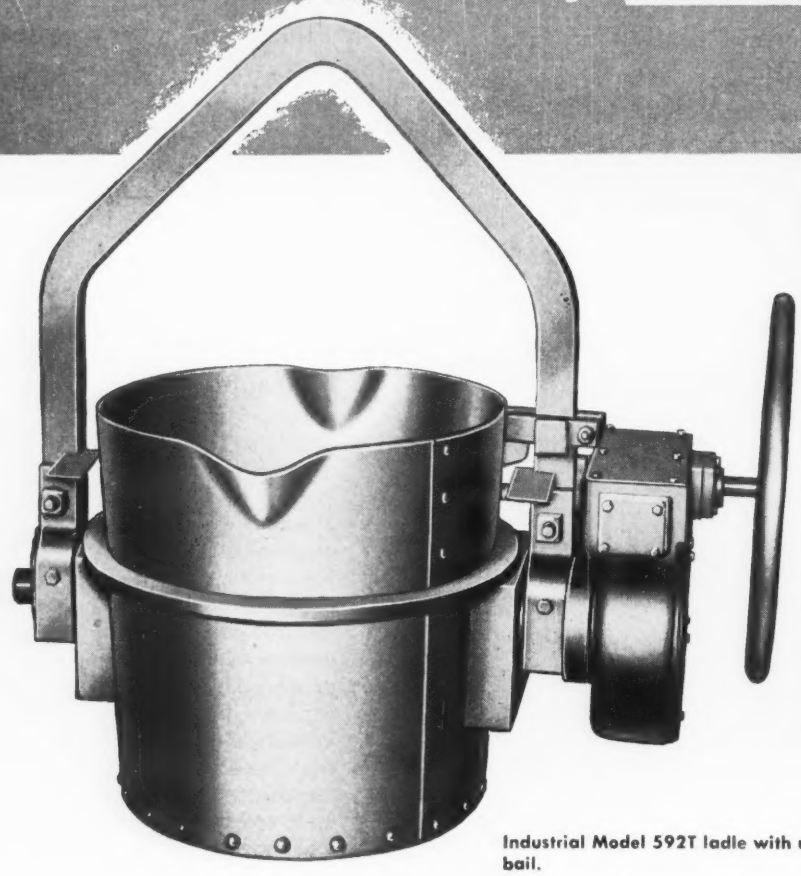
Stroman "JC" Reverberatory Furnaces are built on the same basic ideas as the "air furnace" except that it is smaller and tilts instead of taps to pour . . . MELTING TIMES are the lowest known, ranging from 15 minutes to 2½ hours according to size of furnace and charge. It is excellent for COPPER BASE ALLOYS of low zinc content (containing not over 7% zinc). For such alloys, no more economical method has ever been devised for handling, melting, maintenance, charging, pouring and fuel consumption . . . and you can switch from one alloy to another without contamination. Castings produced from the "JC" are of excellent grain structure and free from porosity. Metal loss is lowest of any other type furnace. IRON MELTING . . . These furnaces will bring cold charges of iron up to casting temperatures of 2800° F., or they may also be used as a holding furnace of metal from a cupola. The "JC" is also highly recommended for special heats as well as production work. It has a decided advantage over a cupola in that it can be used for 6 to 8 successive heats a day. Cupolas cast just once a day. This enables a foundry to operate in slow times as a full crew is not necessary for ample production. These furnaces are gas, oil or combination gas-oil fire. They are automatically tilted and handle their metal perfectly. For greatest speed of melting and utmost economy investigate the Stroman "JC" Reverberatory . . . it will open the door to greater profits for you.

Write for full information and specifications today.

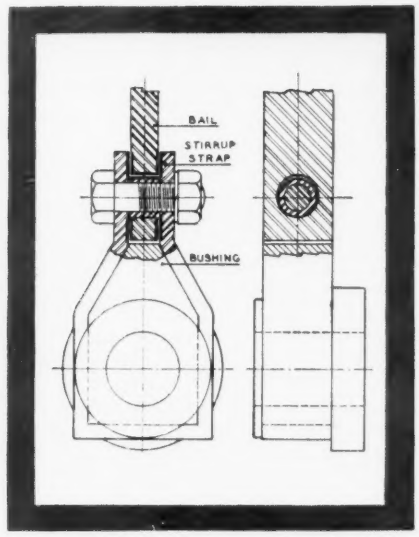
Printed in U.S.A

STROMAN FURNACE & ENGINEERING CO.
DIVISION OF
THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

It's True . . . Binding due to heat distortion COMPLETELY ELIMINATED in this revolutionary Universal Bail Design



Industrial Model 592T ladle with universal bail.



More flexibility than a universal joint. Ample vertical and horizontal adjustments. Misalignment taken care of by rotating swivel action.

Here is one of the really fundamental advances in geared ladle design. Binding problems caused by the steady rise in pouring temperatures have been solved . . . with no sacrifice in strength, safety, or simplicity.

You get four distinct advantages with this new universal bail by Industrial Equipment:

1. **Binding due to heat distortion is eliminated.**
2. **Binding due to misalignment is eliminated.**
3. **Gear wear due to binding is eliminated.**
4. **No lubrication or adjustment is ever needed.**

This new bail is the result of a project on which Industrial Equipment has been working for over four years. Many novel and ingenious designs were proposed and discarded before the final design was accepted. Like all good things it is simple. Yet notice that in addition to simplicity it is rugged, safe, and dependable.

You should also know that this new bail has been thoroughly foundry tested. We emphasize this because the more severe the conditions, the more evident was its design superiority. Operators, for example, say they have never operated a ladle that was easier to handle *regardless of conditions.*

Look to Industrial Equipment for the really basic improvements in foundry pouring and handling equipment. *Write, wire, or telephone today for full details.*

Do you have our revised catalog No. 35?

Industrial EQUIPMENT CO.

115 N. OHIO ST., MINSTER, OHIO

LADLES • BOWLS • SHANKS • BAILS • TONGS • SPECIAL EQUIPMENT

For rapid cleaning of Meehanite® castings, Fulton foundry uses CLECO Chippers

Fulton Foundry & Machine Company of Cleveland, Ohio, makes big Meehanite® castings for builders of heavy machinery. Cleaning these castings is a big job that can be most expensive unless the right tools are used.

That is why Fulton has selected Cleco Chippers. Workers like the fast action and easy handling. Management likes the high production and low maintenance costs.

Cleco Chippers save time and money cleaning all types of castings from cast iron to stainless steel — from magnesium to bronze. Ask for a demonstration in your plant — right away.

CLECO AIR TOOLS

PNEUMATIC DALLETT ACCESSORIES

CLECO DIVISION

of the REED ROLLER BIT COMPANY, 5125 Clinton Drive, Houston 20, Texas, U.S.A.

DIVISION OFFICES

GEORGIA: Atlanta 3, 502 Peters Bldg. • OHIO: Cincinnati 2, 729 Temple Bar Bldg. • MASSACHUSETTS: Worcester, 23 Enfield Street
MISSOURI: St. Louis 3, 2322 Locust St. • ILLINOIS: Chicago, 5701 West Madison St. • MARYLAND: Baltimore 20, 39D Oak Grove Drive
TEXAS: Fort Worth, 1717 East Presidio • MICHIGAN: Detroit, 18071 Wyoming Ave. • CALIFORNIA: Los Angeles, 1317 Esperanza Street
NEW JERSEY: Newark 4, 75 Lock St. • PENNSYLVANIA: Philadelphia 20, 5220 N. Fifth St. . . . Pittsburgh: Room 621, Highland Bldg.

In Canada: Cleco Pneumatic Tool Company of Canada, Ltd., 927 Millwood Road, Toronto (Leaside), Ontario
DISTRIBUTORS IN PRINCIPAL CITIES OF THE UNITED STATES AND THROUGHOUT THE WORLD

3432

Bill — you can get smoother cores with Mogul!

LARGEST SELLER IN THE FIELD!

Kordek, the preferred dry bond for cores . . .

• CUTS DRYING TIME • CUTS DOWN DISCARDS

Full technical service, without obligation, is available to show how you can profit from the use of MOGUL® Cereal Binder in your production.

Write Technical Sales Department

CORN PRODUCTS REFINING COMPANY • 17 BATTERY PLACE, N. Y. 4, N. Y.

ALGOMA STEEL CORPORATION, LTD.
Sault Ste. Marie, Ontario

AMERICAN DISTRICT STEAM CO., INC.
North Tonowanda, New York

ANDERSON BRASS WORKS, INC.
Birmingham, Alabama

ATTWOOD BRASS WORKS
Grand Rapids, Michigan

BUILDERS IRON FOUNDRY
Providence, Rhode Island

CHICAGO HARDWARE FOUNDRY CO.
Chicago, Illinois

ELECTRIC MATERIAL CO.
North East, Pennsylvania

ELKHART BRASS MFG. CO., INC.
Elkhart, Indiana

EMPIRE PATTERN & FOUNDRY CO.
Tulsa, Oklahoma

ERTEL MFG. CORP.
Indianapolis, Indiana

BRIDGEPORT BRASS CO.
Exeter, New Hampshire

GOLDENS' FOUNDRY & MACH. CO.
Columbus, Georgia

GRIFFIN WHEEL COMPANY
Chicago, Illinois

HAMILTON BRASS & ALUM. CSTG. CO.
Hamilton, Ohio

HOOD RUBBER CO.
Watertown, Massachusetts

KENOSHA BRASS & ALUM. FOUNDRY
Kenosha, Wisconsin

KINGWELL BROS., LTD.
San Francisco, California

LAYNE & BOWLER CORP.
Montebello, California

MAGNUS METAL DIVISION
Chicago, Illinois

MANUFACTURERS' IRON FOUNDRY, INC.
Bridgeport, Connecticut

MICHIGAN WHEEL COMPANY
Grand Rapids, Michigan

THE F. E. MYERS & BROS. CO.
Ashland, Ohio

NATIONAL ALUMINUM & BRASS
Independence, Missouri

NELSON FOUNDRY COMPANY
Morton Grive, Illinois

ONTARIO MALL. IRON CO., LTD.
Oshawa, Ontario

OTACO, LTD.
Orillia, Ontario

THE PEERLESS FOUNDRY COMPANY
Cincinnati, Ohio

PONTIAC FOUNDRY CO., INC.
Fort Wayne, Indiana

C. & G. POTTS & CO.
Indianapolis, Indiana

RED JACKET MFG. CO.
Davenport, Iowa

RICHMOND FOUNDRY & MFG. CO.
Richmond, Virginia

SEALED POWER CORPORATION
Muskegon, Michigan

STANDARD BRASS & MFG. CO.
Port Arthur, Texas

UNITED STATES FOUNDRY CORP.
Milwaukee, Wisconsin

UNIVERSAL BRASS MFG. CO.
Los Angeles, California

THE VOLLRATH CO.
Sheboygan, Wisconsin

WESTINGHOUSE ELECTRIC CORP.
Attica, New York

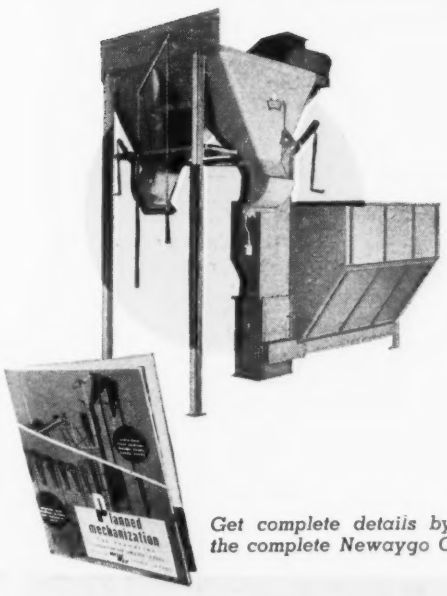
WEBER-KNAPP CO.
Jamestown, New York

J. A. WEAVER CO.
St. Louis, Missouri

Space permits only a partial listing of repeat users.

is your foundry on this list?

HANDY SANDY'S COST-CUTTING PERFORMANCE MADE REPEAT USERS OF THESE FOUNDRIES



By eliminating shoveling from molding, the Handy Sandy has cut molding costs so greatly for the foundries listed on this page they have all become multiple users. Production increases of 35% to 70% and over are common because molders spend more time molding and less time getting ready.

The Handy Sandy is a low-cost, individual-floor Sand Handling Unit that puts the sand in an overhead storage hopper where it is available to the molder without effort. He just pulls the release and the sand falls into the flask. In addition it has a built-in aerator that gives the sand extra blending and improves its texture and permeability.

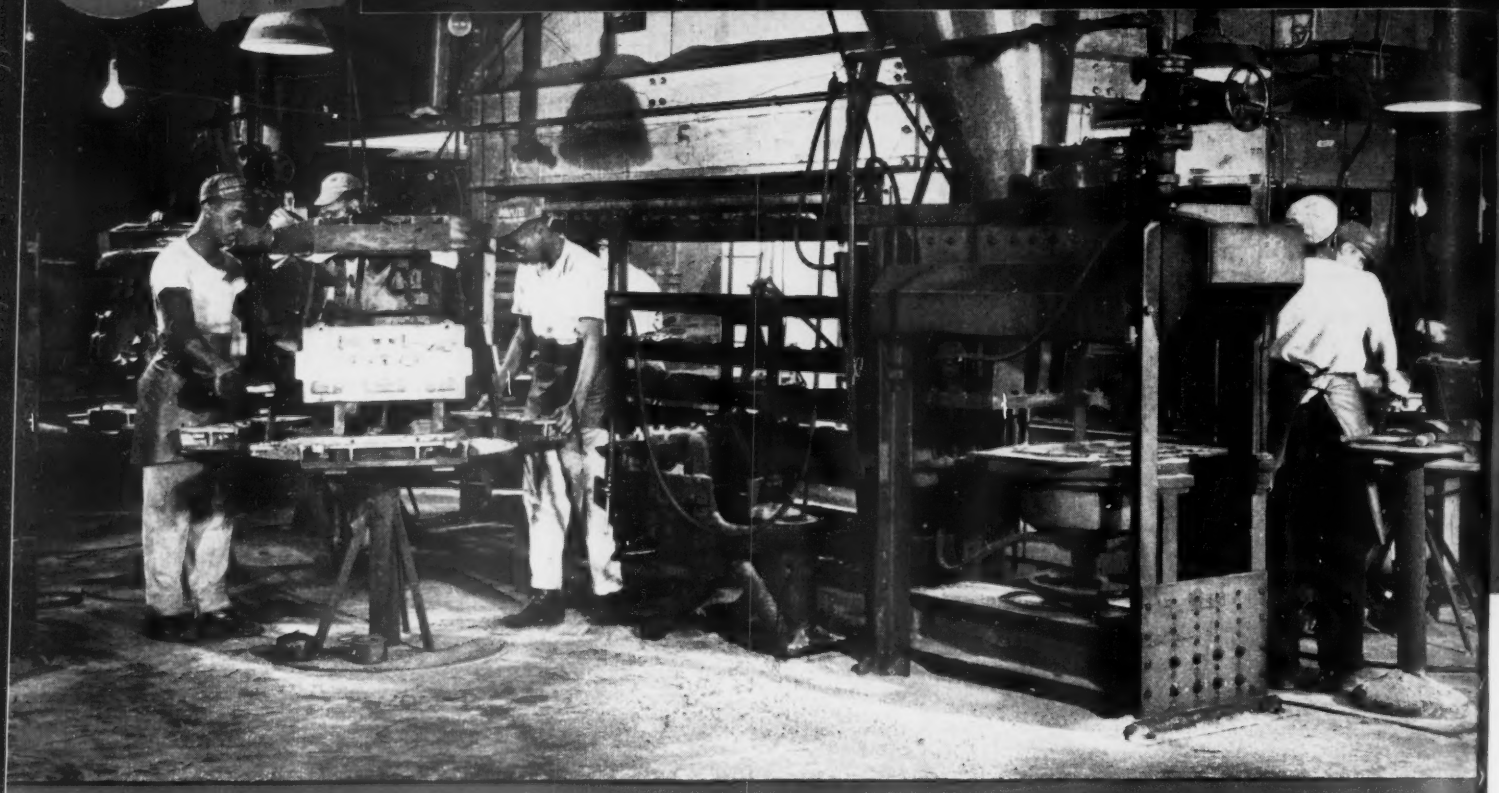
Waste motions add nothing to the quality of your castings. The Handy Sandy eliminates waste motions and gives you the savings.

Get complete details by sending for the complete Newaygo Catalog today.

NEWAYGO ENGINEERING COMPANY

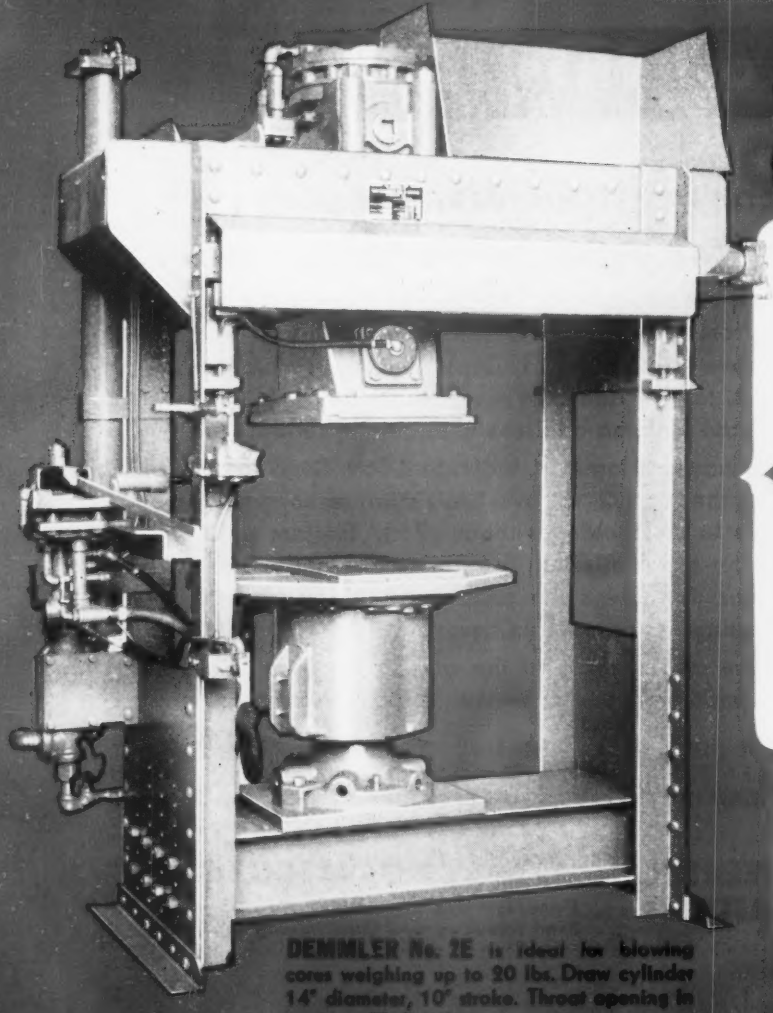
NEWAYGO, MICHIGAN
Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment

32 DEMMLER CORE BLOWERS h

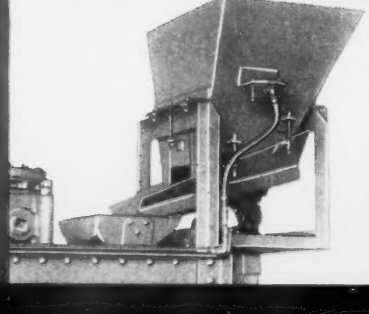


Better 8 Ways

1. Ultra high speed blow valve action — increasing initial blow pressure 25% above other machines.
2. Magazine exhaust valve — extra large size — quick acting — immediately exhausts air from magazine after core is blown.
3. Carriage rails — on outside of machine frame — out of sand area — where drawing accuracy would be impaired.
4. Leveling adjustment — 4 screw adjustment for complete adjustment of core box to draw — EASILY ACCESSIBLE.
5. Completely enclosed drawing post — drawing accuracy within thousandths — protected from sand and abrasion — assuring long, trouble-free life.
6. 2 speed hydraulic draw control — low speed while vibrator is acting and quick drop after core is drawn.
7. Hard, chrome plated valve seats—insure against rust and deterioration.
8. All parts of machine easily accessible for low maintenance costs.



DEMMLER No. 2E is ideal for blowing cores weighing up to 20 lbs. Draw cylinder 14" diameter, 10" stroke. Throat opening in carriage 7" diameter.



DEMMLER Vibratory Sand Feeders increase core blower production as much as 25%! Sand stored in large hopper flows like water while vibrators are operating. Powered by rotary type pneumatic vibrators. Ends poking sand nuisance!

Shelp speed *Studebaker* production

The efficient manner in which Studebaker doubled capacity of their foundry is a well known story to the trade today.

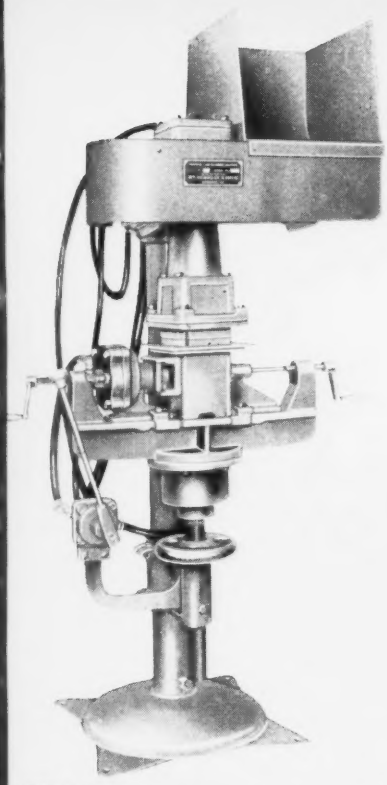
It pays tribute to the alert minds and capable hands for which the South Bend plant has long been known.

We at DEMMLER are gratified that these progressive Studebaker people have come to depend to a large extent on DEMMLER core blowers for their enviable record of fast, economical production of quality cores.

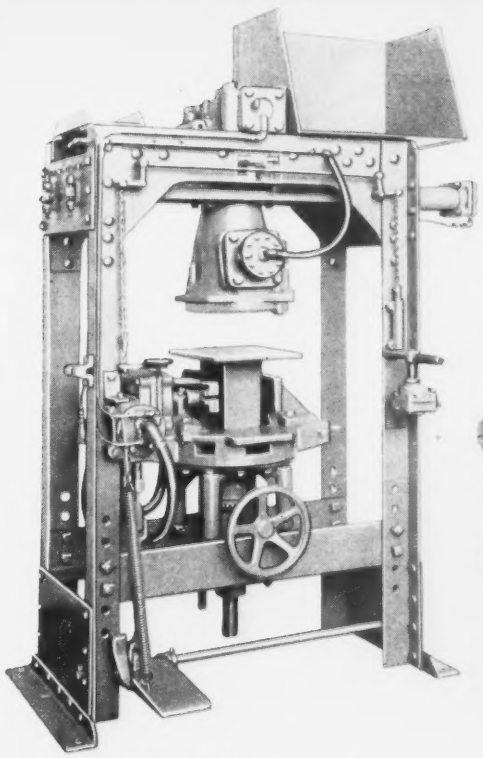
Thirty two DEMMLER core blowers are now in service at Studebaker!

Foundries everywhere have found that DEMMLER core blowers, because of their many outstanding features, are the wisest core blower investment on the market today!

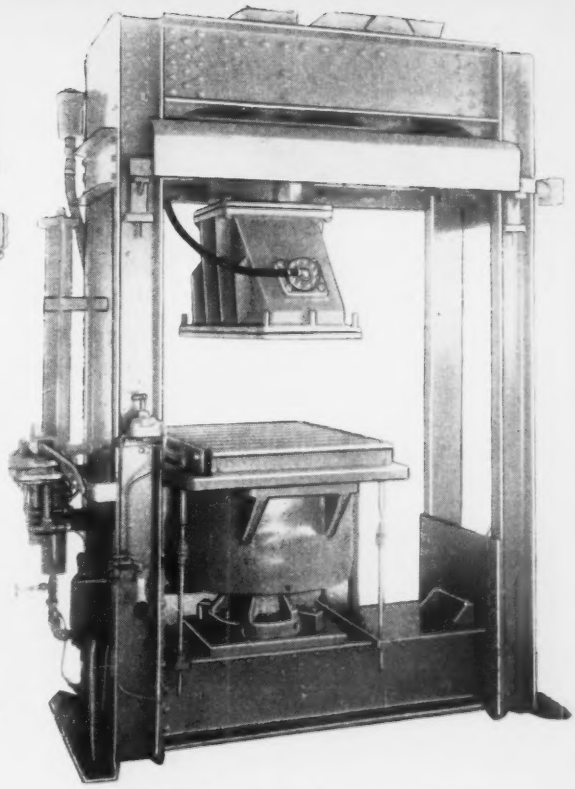
That's because DEMMLER core blowers — and only DEMMLER Core Blowers — offer you all eight of the important design features by which core blower value is determined.



DEMMLER No. 55 provides answer to fast, economical production on short run jobs! One hand valve operates both vertical and horizontal core box clamps. Capacity, cores weighing up to 5 lbs.



DEMMLER No. 1 is general purpose machine. Vertical clamping diaphragm, 10½" diameter. Capacity, 8 to 10 pound cores. One of the most popular core blowers ever built.



DEMMLER No. 4E handles cores weighing from 35 to 250 lbs. and up in weight. Draw cylinder 20", 22" or 26" diameter, 10" stroke. Throat opening in carriage 13" diameter.

Wm. DEMMLER & BROS., Kewanee, Illinois

MANUFACTURERS OF CORE BLOWERS EXCLUSIVELY SINCE 1911

Cut the costs of your rough grinding by selecting Norton wheels

built to fit the job

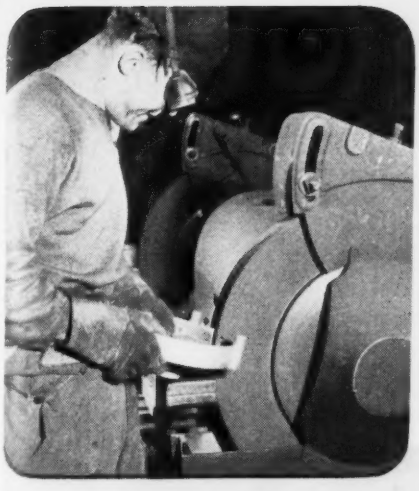
Whether your rough grinding involves ferrous or non-ferrous metals — portable, floorstand or swing frame machines — there's a Norton wheel engineered to fit your job.

As foundry men know, the careful selection of the *right* wheel makes a big difference in the cost of rough grinding. Faster cutting action, for instance, and safer, longer lasting wheels all add up to greater efficiency . . . more economy.

In the 56-page Norton booklet, "Rough Grinding," you will find real help in selecting Norton grinding wheels for foundry use. Different applications are described in detail including specific recommendations for grinding tough alloy and carbon steels, cast iron, soft malleable, hard malleable, brass, aluminum, and magnesium. Ask your nearby Norton distributor's representative for a copy of this booklet or write direct for Booklet 1405. NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Inc., Worcester, Massachusetts.

See your Norton distributor for aid in grinding wheel selection

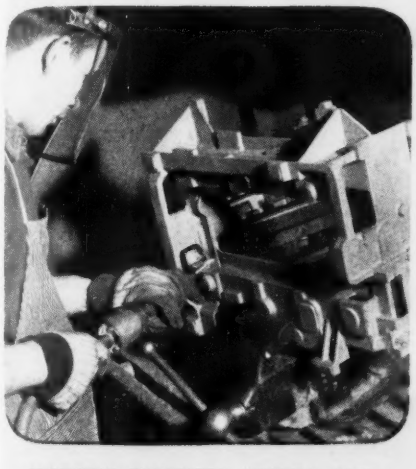
Your Norton distributor will be glad to show you how the right grinding wheel can help you do your foundry grinding in the shortest possible time, at the lowest possible cost. Ask him for his recommendations. He's listed under "Grinding Wheels" in your classified telephone directory.



A NORTON WHEEL FOR FLOORSTAND GRINDING is made to do the job just right considering the spindle speed, type of metal to be ground, amount of grinding pressure applied, and area of contact.

NORTON WHEELS FOR PORTABLE GRINDING are easy to use, cut fast and continuously because they have in-built balance and hug the work. They include straight and cup wheels, cones and hub wheels.

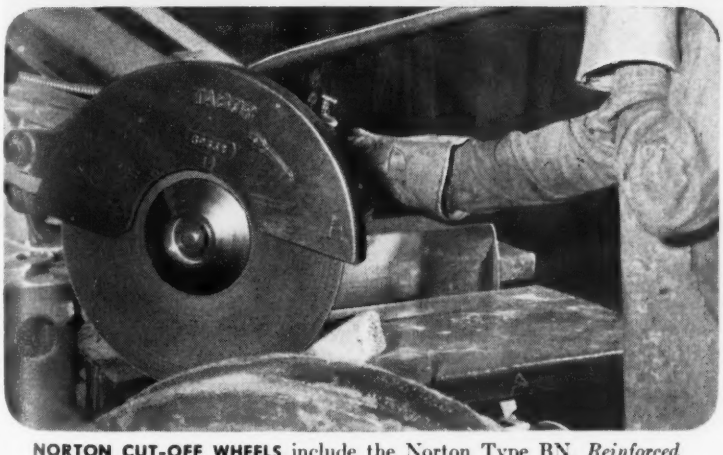
NORTON WHEELS FOR SWING FRAME WORK are made to remove a lot of metal — and fast. They're available in resinoid bond for high speed operation and BE vitrified for slow speed.



NORTON MOUNTED WHEELS AND MOUNTED POINTS are excellent for cleaning hard-to-get-at places. Available in both CRYSTOLON* and ALUNDUM* abrasives in resinoid and vitrified bonds.

NORTON ABRASIVE CORE FILES are effective and economical for touching up cores. Made of CRYSTOLON abrasive, resinoid bonded, and reinforced with steel, you'll find them lots more satisfactory than old steel files.

NORTON RUBBING BRICKS are just what you need for cleaning off sand and giving a casting a good going over. Made of CRYSTOLON abrasive they come in several grit sizes. The Norton distributor's man will suggest a good one for you.



NORTON CUT-OFF WHEELS include the Norton Type BN, *Reinforced Resinoid* Wheel shown here. Faster than band saws for cutting gates and risers, this wheel has built-in safety that assures protection against wheel breakage. The new Norton BFR *Reinforced* Hub Wheel is also handy for cutting and notching gates and risers and it does a good smoothing job as well.

NORTON

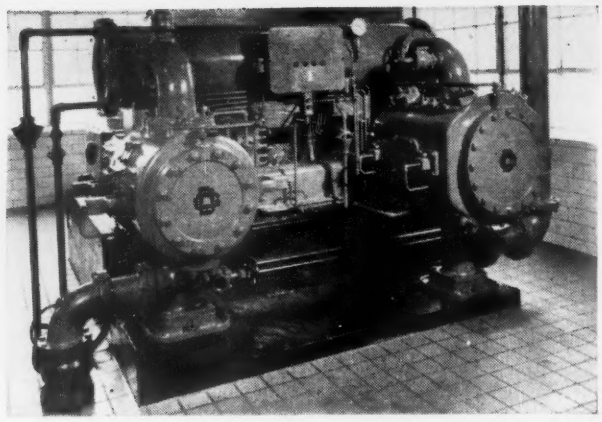
ABRASIVES

Making better products to make other products better

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

USERS

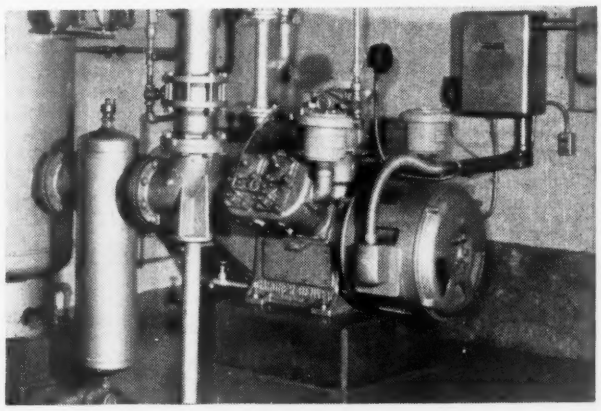
Master mechanic of a Pennsylvania processor tells of five years' experience with their HA. No service trouble whatsoever. In his opinion, the HA is "the best compressor made."



The Gardner-Denver HA Horizontal Two-Stage Air Compressor

TELL

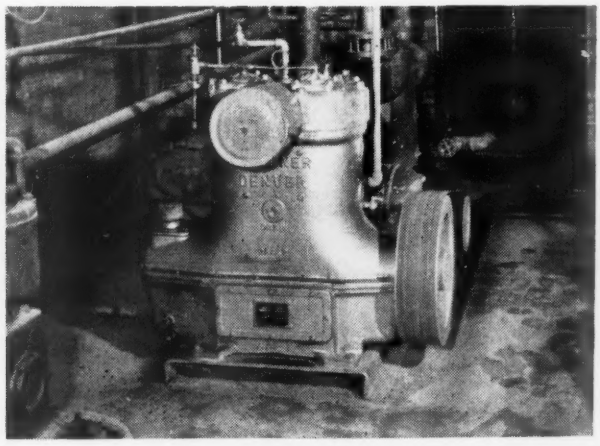
A Kansas City manufacturer has had a WB carrying his full air load almost 24 hours a day for several years. No overhaul required. Has replaced only a few small parts.



The Gardner-Denver WB Vertical Two-Stage Air Compressor

WHY

A manufacturer in Michigan reports he purchased an AA Compressor along with his present building. It's been supplying air for his operations for four years now, and hasn't been touched yet.



The Gardner-Denver AA Vertical Single-Stage Air Compressor

GARDNER-DENVER AIR COMPRESSORS

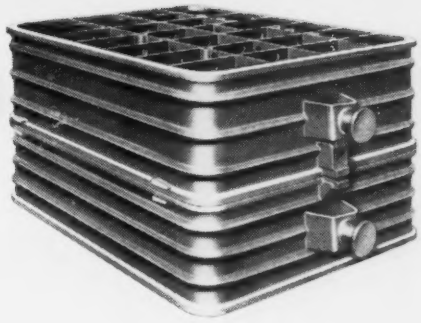
ARE SO OFTEN SELECTED FOR CONTINUOUS HEAVY-DUTY SERVICE IN MILL OR FACTORY. WRITE FOR DETAILS.

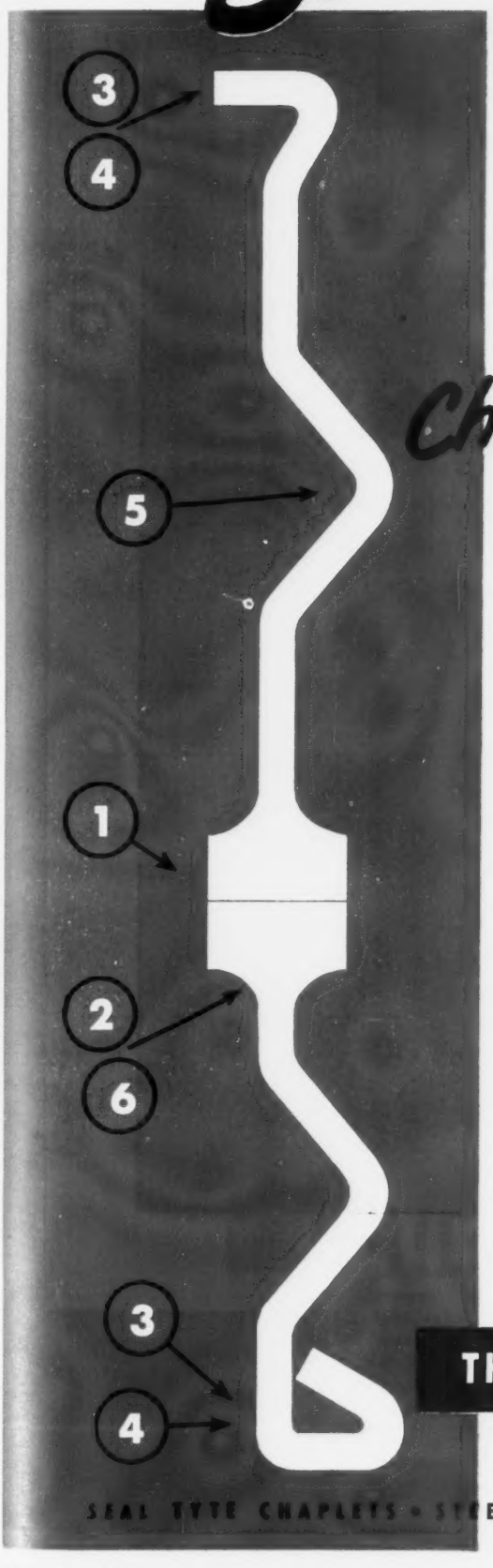
SINCE 1859 **GARDNER-DENVER**

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

A NEW STRONGER





SIDEWALL CONSTRUCTION FOR YOUR STEEL FLASKS

Check These Advantages

1. *You are not limited on flange width or thickness.* Your bearing surface may be as wide or as narrow as you wish.
2. *You are not limited on the amount of sand lock.* Shanafelt welded flanges can be placed for any width sand strip—or none at all.
3. *No unnecessary weight or cost.* Flanges can be welded on all surfaces if wanted but, if heavy flanges are not necessary opposite the parting, use the economical and weight saving Shanafelt formed flanges.
4. *Formed flanges opposite the parting can be turned either in or out* to suit your requirement, or made in the special formation as illustrated.
5. *Sidewall corrugations add strength to the flask* without increasing weight or cost.
6. *No skip welding.* Automatic welding equipment assures strong continuous fillet weld.
7. *Sidewalls of copper bearing, rust resisting steel,* rolled specially for Shanafelt flasks.

It will pay you to investigate this latest style Shanafelt heavy duty flask. You will find it strong, durable, and reasonably priced. Quotations of cost and weight will be submitted promptly upon receipt of your inquiries. Technical Bulletin F-10 shows details of all styles and sizes of Shanafelt Steel Flasks. We would like to supply copies to all members of your organization who are concerned with your flask equipment.

THE SHANAFELT MANUFACTURING CO.

Established 1893

2600-2700 WINFIELD WAY N. E. CANTON, OHIO

SEAL TYTE CHAPLETS • STEEL FOUNDRY FLASKS • FLASK PINS AND BUSHINGS

Although maligned in folklore as a bird of ill omen, and in comparatively recent times persecuted by farmers and hunters, it is now quite common knouledge that the owl is a valuable ally of the farmer. By night, it takes wing to do greater execution than scores of traps. Rats, mice, bats, grasshoppers, beetles and other insects make up its fare. From a purely economic standpoint, it would be difficult to name a more beneficial bird.

WISDOM

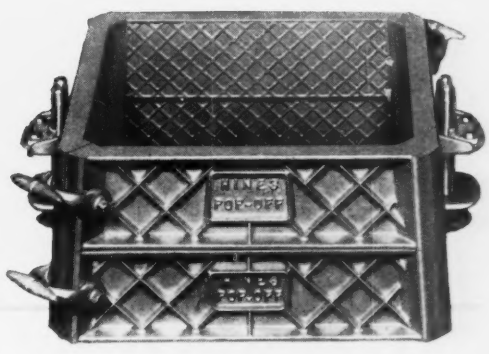
The owl's only claim to wisdom is based on ancient Grecian mythology, together with an attitude and mien suggestive of deep thought. Nevertheless, this solemn bird is generally regarded as the symbol of wisdom.

However, there's nothing mythical about the sound judgment that prompts the selection and use of HINES FLASKS. When it comes to choosing flasks for routine or difficult casting jobs, foundrymen demonstrate clear thinking by selecting HINES FLASKS. For there's no other foundry equipment in which they can invest that will pay them more substantial dividends.

So why not be smart? Next time you're in the market for flasks—be sure to investigate HINES FLASKS.

HINES FLASKS

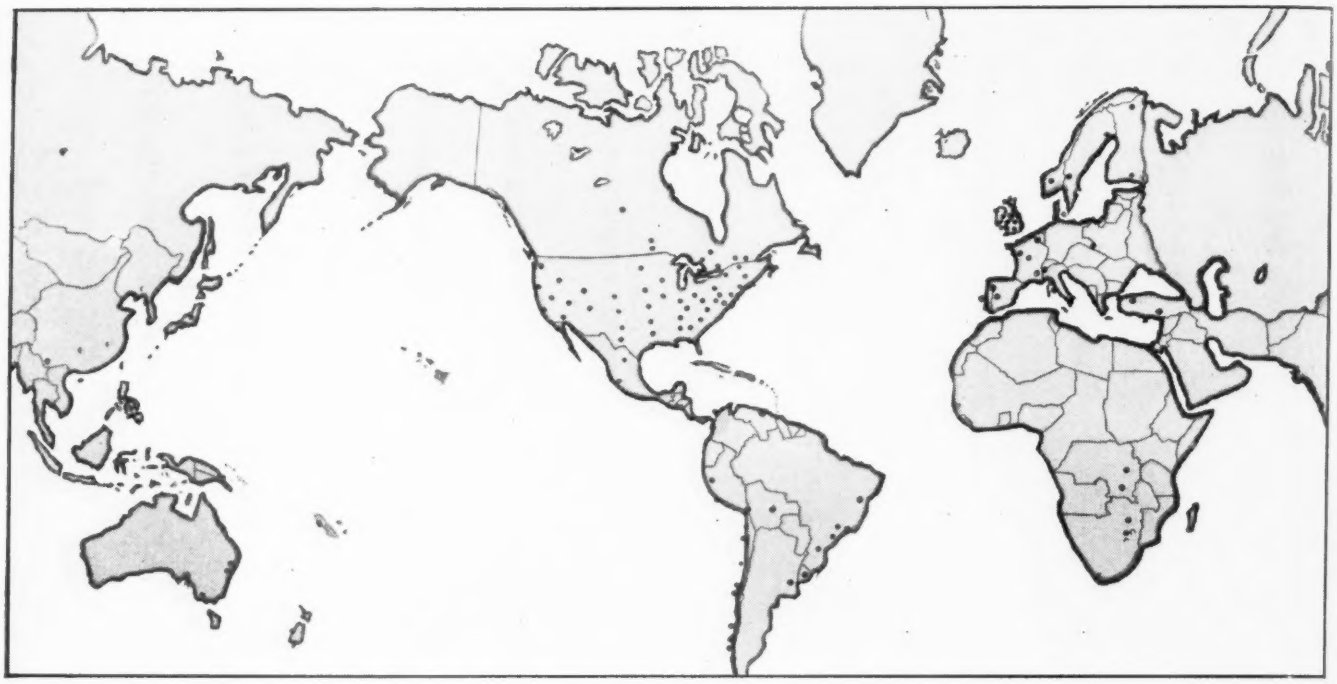
HINES POP-OFF FLASK



THE HINES FLASK CO.,

3431 WEST 140TH STREET, CLEVELAND 11, OHIO • TELEPHONE: ORCHARD 1-2806

THE WORLD MELTS WITH *Lectromelt** ...



35 Countries...1,056 Lectromelt Furnaces...2,480,000 KVA

LECTROMELT FURNACES THE WORLD OVER

Country	No. of Furnaces
AFRICA	28
ARGENTINA	2
AUSTRALIA	12
BELGIUM	2
BOLIVIA	2
BRAZIL	30
CANADA	50
CHILE	11
CHINA	17
COLOMBIA	7
DENMARK	2
ENGLAND (BR. ISLES)	70
FINLAND	4
FRANCE	4
HAWAII	1
ITALY	16
INDIA	9
JAPAN	2

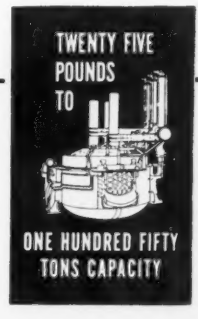
Country	No. of Furnaces
MEXICO	20
NEW CALEDONIA	2
NEW ZEALAND	4
NORWAY	2
PANAMA CANAL	2
REP. OF PANAMA	1
PERU	4
PHILIPPINE ISLANDS	3
POLAND	3
PORTUGAL	4
RUSSIA	69
SPAIN	26
SWEDEN	8
TURKEY	2
UNITED STATES	635
URUGUAY	1
VENEZUELA	1

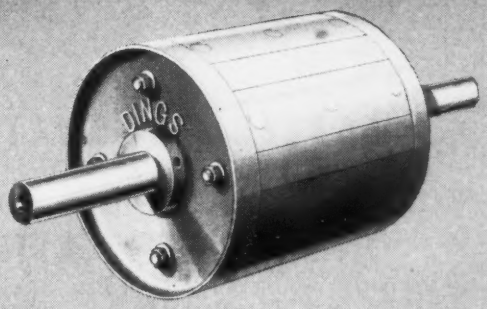
Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . AUSTRALIA: Birlec, Ltd., Sydney . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S.A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa.

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

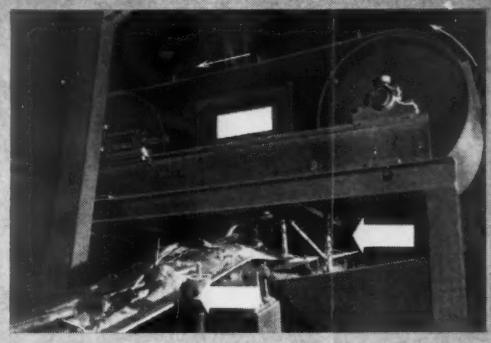
WHEN YOU MELT... *Lectromelt*





Dings Non-electric, Permanent Perma-Pulley.

1. 2. 3. 4.



Dings Extra Powerful Self Cleaning Rectangular.

Dings All-Welded Cooler Operating Lifting Magnet.

Dings "Holdtite" holds castings in position for swing grinding.

4 WAYS TO CUT HANDLING COSTS

Compare the advantages these Dings magnets offer over your present methods:

1. THE NON-ELECTRIC, PERMANENT PERMA-PULLEY in the sand handling system takes iron out automatically, without attention, without electricity, without maintenance. Perma-Pulleys have no operating expense, are guaranteed to be permanently magnetic. Magnetic strength is certified.

2. THE SELF CLEANING RECTANGULAR FOR THE TOUGHEST JOBS . . . *another sand handling cost-cutter.* Great power enables this magnet to handle particularly difficult iron extraction jobs. For *maximum* iron removal, none can surpass the Dings Rectangular. Self-cleaning feature makes operation automatic—eliminates "carry-over" of sand with iron.

3. LIFTING MAGNET LIFTS 10 TO 100% MORE. Ideal for handling scrap, pig iron, castings, metal flasks, etc. Lifts more because it's cooler operating. All welded, lightweight, moisture-proof, rugged, 4-point chain suspension.

4. "HOLD-TITE" CUTS GRINDING LABOR COSTS UP TO 25%. Firmly holds all shapes of castings up to 1000 lbs. in position for swing grinding. Magnet can be tilted to 7 different positions. Requires practically no maintenance, simple to install. SEND FOR THIS PAPER: *"Lowering Cleaning Room Costs Through Use of Magnetic Chucks"*. Use coupon below.

If you can use the advantages these magnets offer, NOW is the time to act. Deliveries are still better than average.

Dings

DINGS MAGNETIC SEPARATOR CO.
4708 W. Electric Ave., Milwaukee 46, Wisconsin

SEND THIS COUPON
OR DROP A POSTCARD

Dings: Send me Catalog containing full information on

☐ PERMA-PULLEY ☐ LIFTING MAGNET
☐ RECTANGULAR ☐ "HOLD-TITE" plus

Article on "Lowering cleaning room costs through the use of magnetic chucks"

NAME .....

COMPANY .....

ADDRESS .....

.....

.....

DELTA *Specialized* FOUNDRY PRODUCTS

FOR FASTER PRODUCTION OF FINER-FINISH CASTINGS

... at lower cost!

FOR SAND

DELTA Permi-Bond (seacoal replacement)
Sand Conditioning Oils
96-B Sand Release Agent

FOR CORES

DELTA Core & Mold Washes for steel, malleable, gray iron and non-ferrous metals.
Mudding and Patching Compounds
No-Vein Compound
Dri-Bond Binder
Core Rod Dip Oils
Sand Conditioning Oils
Core Oils
Partex
Liquid Parting
Bondite

FOR MOLDS

DELTA Core & Mold Washes for steel, malleable, gray iron and non-ferrous metals.
Partex (Nut Shell Parting)
Liquid Parting
Spray Binders
Bondite

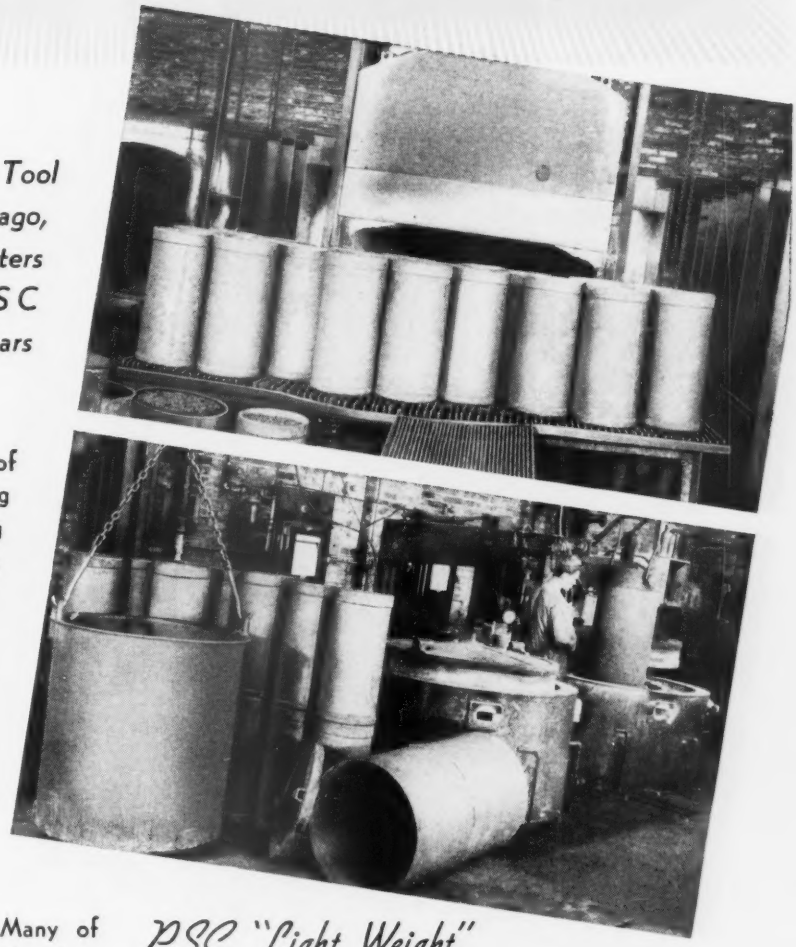
The quality and uniformity of DELTA SPECIALIZED FOUNDRY PRODUCTS are laboratory controlled to insure consistent results in use. Liberal working samples, together with complete instructions for use will be sent to you without cost or obligation. WRITE TODAY.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF
SPECIALIZED FOUNDRY PRODUCTS
MILWAUKEE 9 • WISCONSIN

MANY VIP IN HEAT-TREAT FIELD HAVE USED PSC 'LIGHT-WEIGHT' EQUIPMENT FOR OVER 20 YEARS

Very Important People Are Perfection Tool and Metal Heat Treating Co. of Chicago, One of Largest Commercial Treaters in Nation. They Have Used PSC Containers Exclusively for Over 20 Years



Pictured at right are views in plant of Perfection Tool & Metal Heat Treating Co. of Chicago, showing PSC heat-treating containers in use. One of the foremost commercial heat-treaters in the country, Perfection has been employing PSC "Light-Weight" equipment exclusively since 1929, the year they placed their first order. Suggesting the many different types of containers and fixtures we supply Perfection, they use thirty different sizes of the carburizing boxes pictured at top.

Among the users of PSC heat-treating units are the majority of the metal-working firms in America today. Many of them have been users since the late 20's when this new light-weight, welded alloy equipment was introduced. PSC units furnished in any size, design or metal specification: annealing and carburizing boxes, fixtures, retorts, covers, etc. Send blue prints or write as to your needs.

PSC "Light Weight"

Heat-Treating Equipment for Any Product and Any Metal

Carburizing and Annealing Boxes
Baskets · Trays · Fixtures
Muffles · Retorts · Racks
Annealing Covers and Tubes
Pickling Equipment
Tumbling Barrels · Tanks
Cyanide and Lead Pots
Thermocouple Protection Tubes
Radiant Furnace Tubes and Parts
Heat, Corrosion Resistant Tubing

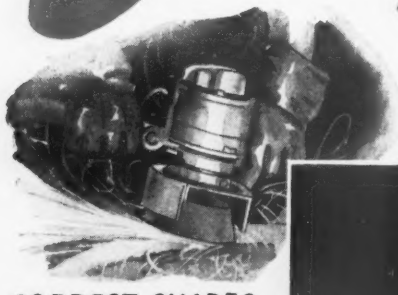
THE PRESSED STEEL COMPANY

of WILKES-BARRE, PENNSYLVANIA

Industrial Equipment of Heat and Corrosion Resistant WEIGHT-SAVING *Sheet Alloys*

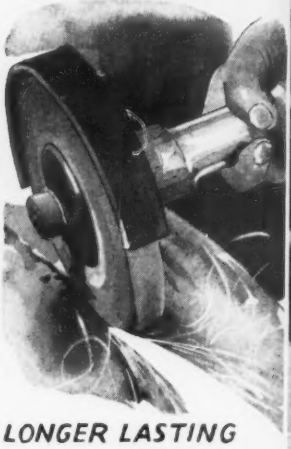
☆ ☆ ☆ OFFICES IN PRINCIPAL CITIES ☆ ☆ ☆

STERLING-THE BETTER PORTABLE GRINDING



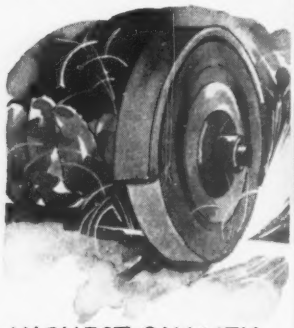
CORRECT SHAPES

TAILOR MADE



LONGER LASTING

FASTER



HIGHEST QUALITY

SHOCK ABSORBING

EASILY HANDLED

"THE WHEELS OF INDUSTRY"

STERLING GRINDING WHEELS

Plus VALUE

ABRASIVE PRODUCTS FOR

- BETTER GRINDING
- FASTER GRINDING
- LOW COST GRINDING

THE STERLING GRINDING W

OF THE CLEVELAND Q

...AND FASTER WAY TO DO ...AT THE LOWEST POSSIBLE COST!

These superior, high-speed "Wheels of Industry" combine special bonds and abrasive grains to provide efficient, economical grinding of castings.

Sterling's F or P Bonds, with special, hard, sharp abrasive grains in proper sizes, offer proper specifications for better portable grinding of gates, risers and fins, welds, pipe, bar stock, sheet metal, billets, etc.

Sterling Portable, High-Speed, Resinoid Grinding Wheels handle easily on the job . . . they do the work, not the operator! There is no need to "bear down" to get better production . . . these wheels are carefully built to accomplish much in a shorter time without operator fatigue.

Try them before you buy them! A test run, under conditions you select, will readily prove the natural superiority of these Sterling wheels for any roughing or finishing operation in your plant. Write us at no obligation!

BEST IN THE TEST — THAT'S STERLING

A Sterling cup wheel, size 8x1x⅝, specification KA146 P6 B4, was tested against competitive brands in a well known plant grinding steel castings. The Sterling "Wheel of Industry" was much better than the other wheel---offered much longer life and faster stock removal.

Such results are not unusual. In your own plant, Sterling Grinding Wheels will give you extra values far beyond what you would ordinarily expect. Our engineers wait the opportunity to serve you with a wheel test or complete grinding survey of your equipment . . . no obligation, of course!

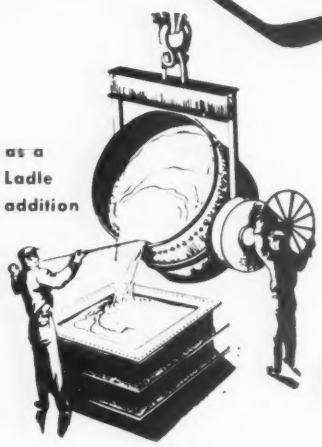
Ask for These Free STERLING Research and Development Folders...

In these folders you have an interesting bird's eye view of all types of grinding procedures. If you are interested in knowing the proper wheel to use on various kinds of grinding, these folders will quickly tell you. In addition, there will be sent you the popular "Art and Science of Grinding" now in its fifth edition. Write us on your company letterhead and we will do the rest.

WHEEL DIVISION TIFFIN OHIO
QUARRIES COMPANY

HOW DO YOU BUY FLUXING COMPOUND?

PRICE OR QUALITY



as a Ladle addition

The saving on fluxes selling for a few pennies less is so insignificant when you consider the actual results secured from use in the foundry, that it is well to heed the adage, "You get only what you pay for".

as a Hot Topping and on Risers

Make this "check list" test to see how the flux you now use compares with CASTFLUX SB-10:

- 25% to 50% less CASTFLUX SB-10 is required to do the job better with greater results.
- maximum pipe elimination is secured in iron and steel risers and hot tops with CASTFLUX SB-10.
- a DUAL-PURPOSE FLUX, CASTFLUX SB-10 can be used with excellent results in the ladle to clean, heat and liquefy molten metal.
- metallurgical control assures consistent "batch-uniformity" of CASTFLUX SB-10.
- a partly exothermic compound CASTFLUX SB-10 virtually DOES NOT SMOKE OR CREATE FUME and there is NO CARBON PICK-UP at the neck of riser or casting itself.
- the "pour" is kept hot and liquid for periods 100% to 200% longer with CASTFLUX SB-10.
- 10% to 30% savings in "remelt" metal is effected through "short" pouring of CASTFLUX SB-10.

You may pay less but you can't secure more than you do from CASTFLUX SB-10. That it increases the yield and improves production at considerable savings has been conclusively proven . . . so revolutionary in its advantages that it has become standard usage in foundries and steel mills the world over.

CASTFLUX
Trade Mark Reg.

The 'National' DUAL-PURPOSE FLUX

unconditionally GUARANTEED

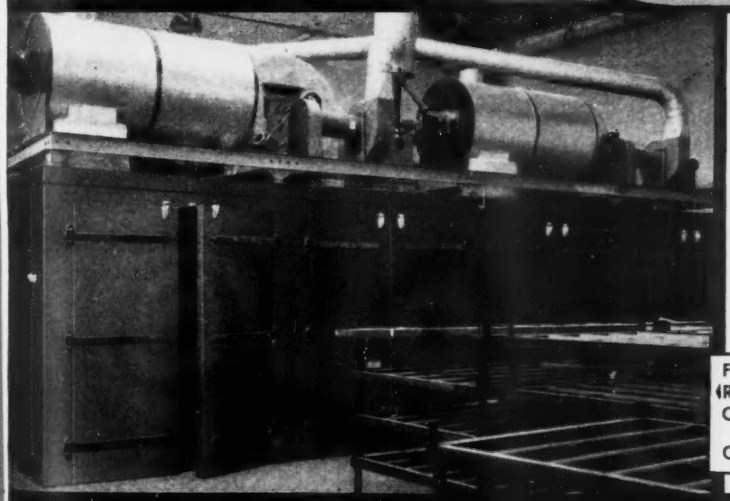
*unless CASTFLUX SB-10 meets with your full approval, material can be returned at no expense within 30 days.

Write for FREE literature "Story of Castflux" and Distributor's name nearest you!

CASTFLUX **NATIONAL pigment co.**

ORTHODOX ST. AT DELAWARE RIVER, PHILA. 37, PA.

Two Compartment Car Type Mold Drying Oven.
Two Compartment Rack Type Core Oven.
Single Compartment Rack Type Core Oven.
LANLY
FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO



The Lanly reputation has been established as the result of the consistent incorporation of advanced, efficient design and high grade construction into every Lanly installation.

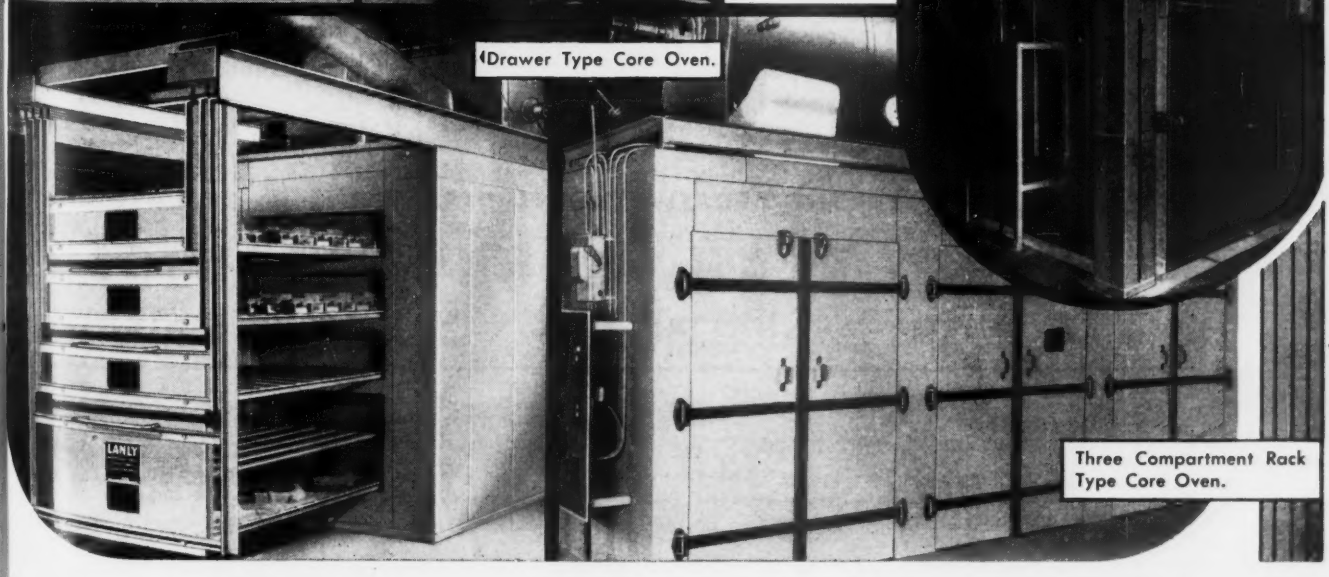
Core baking, pasting and mold drying ovens as well as casting conditioning and heat-treating ovens are available in standard units.

Write for Literature and Complete Information.

Four Compartment Rack Type Core Oven.

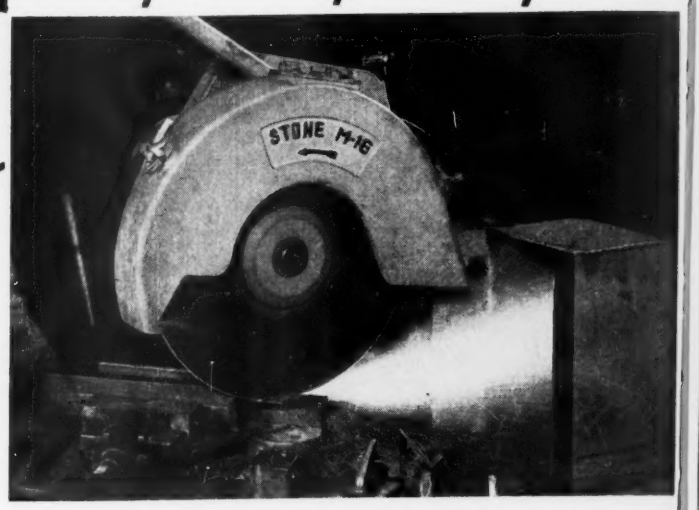
Car Type Core Oven.

Drawer Type Core Oven.

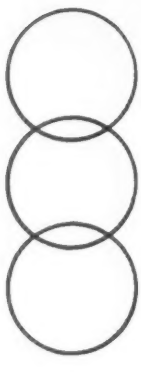


Three Compartment Rack Type Core Oven.

THREE CUTS IN ONE



MANHATTAN CUT-OFF WHEELS



CUT down COSTS, because the number of cuts per wheel have been increased through the development of tougher rubber and resinoid bonds. Replacement wheels are not required as frequently.

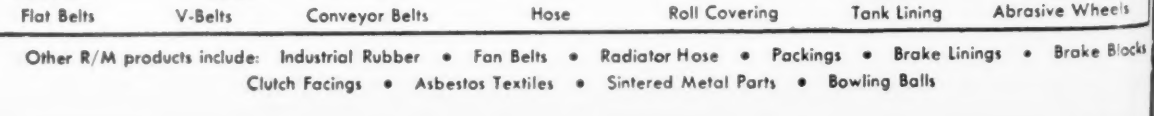
CUT non-productive HOURS, since there is less down-time for wheel changes. Manhattan Cut-Off Wheels designed for specific work and specific materials give better cuts.

CUT out PROBLEMS. Manhattan supplies you with the right cut-off wheel for ferrous or non-ferrous castings, steel bars, pipe, structural shapes, stone or reinforced concrete, light gauge tubing, hardened or soft steel, heat-sensitive alloys, ceramics, or glass.

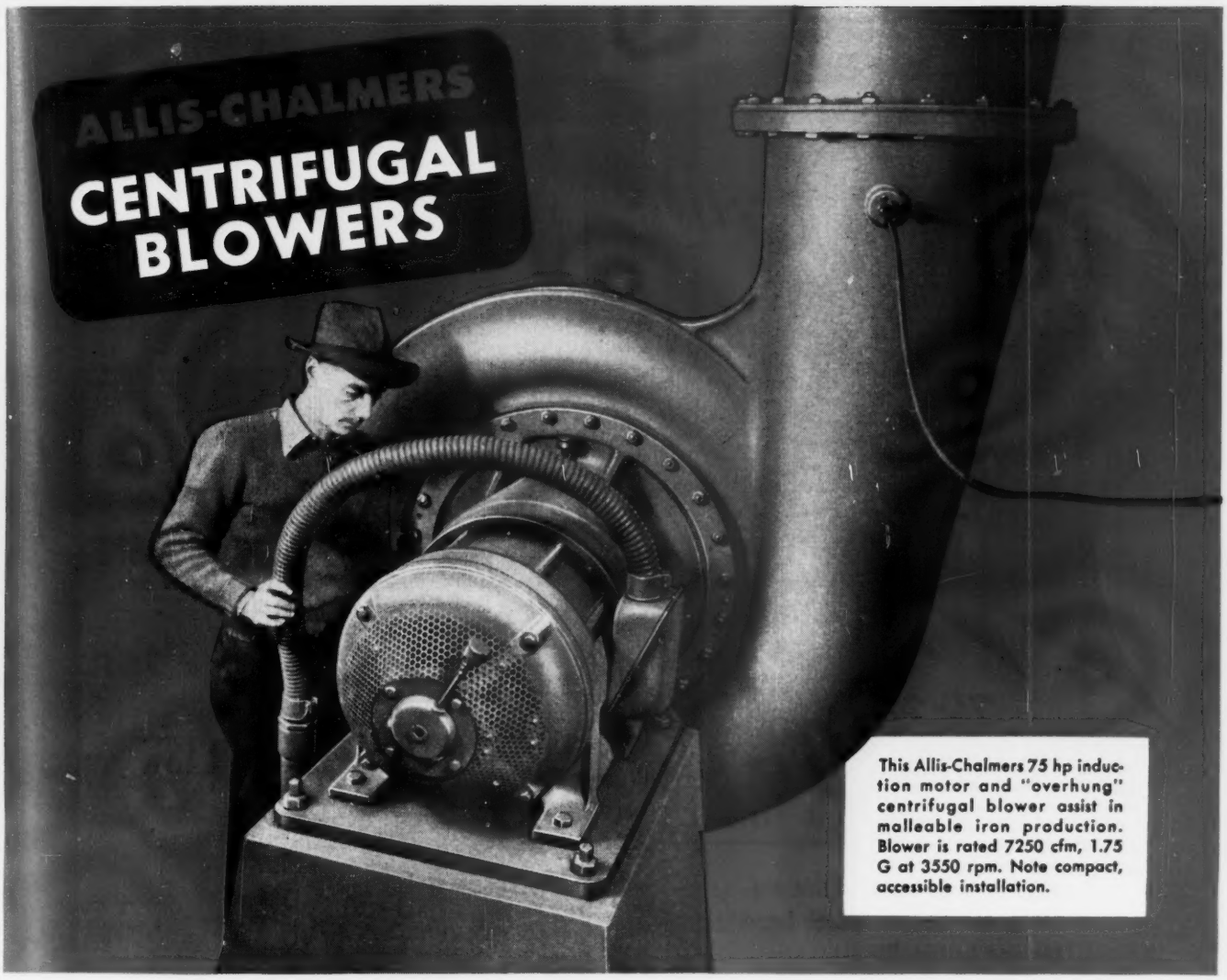
WRITE TO THE ABRASIVE WHEEL DEPARTMENT

MANHATTAN RUBBER DIVISION

RAYBESTOS-MANHATTAN, INC. **PASSAIC, N. J.**



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks
Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bowling Balls



This Allis-Chalmers 75 hp induction motor and "overhung" centrifugal blower assist in malleable iron production. Blower is rated 7250 cfm, 1.75 G at 3550 rpm. Note compact, accessible installation.

Where Control is Vital!

RIGID QUALITY CONTROL is vital when you're making malleable iron. With component elements demanding precise control, cupola operation becomes especially critical.

The Allis-Chalmers centrifugal blower seen above performs this demanding duty 20 to 22 hours daily at the foundry of a large Midwestern malleable iron company.

The constant air weight control on the blower inlet *automatically* delivers more or less air, as required, without the necessity of blowing off to atmosphere and wasting power, as with positive pressure blowers. Connection below flange at upper right goes to discharge pressure gauge.

A metered amount of oxygen enters the cupola, giving a uniform temperature and greater uniformity in composition of the metal. *Wherever* a quality product is desired, consider Allis-Chalmers blowers with constant air weight control. You get these standard features:

- **Compact, close coupled design.**
- **Low noise level, long lived cast iron casing.**
- **Anti-friction bearings supporting the impeller, only moving part.**

For complete information call your nearest A-C sales office or write to Allis-Chalmers, Milwaukee 1, Wis. for Bulletin 16B6048A.

A-3430

ALLIS-CHALMERS

Foundromatic and Regulex are Allis-Chalmers trademarks.

A-C ALLIS-CHALMERS

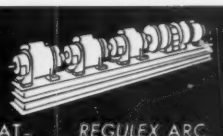
Foundry Equipment for Bigger Output-Better Working Conditions!

FOUNDROMATIC SHAKEOUTS

MOTORS-DRIVES-CONTROL

FOUNDROMATIC CORE DRYER

INDUCTION HEATING & MELTING


REGULEX ARC FURNACE CONTROL

Fremont MAGNESIUM FLASKS

The Way to

MORE EXACTING WORK

Accurately machined inside surfaces and flanges. Steel faced top and bottom flanges.

LONGER SERVICE

Magnesium has twice the tensile strength of aluminum.

EASIER HANDLING

Magnesium weighs 1/3 less than aluminum.

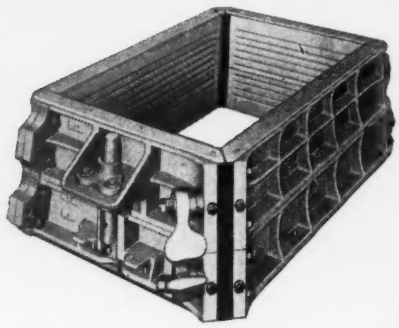
All orders given prompt attention. Write today for literature.

THE FREMONT FLASK CO.

FREMONT, OHIO

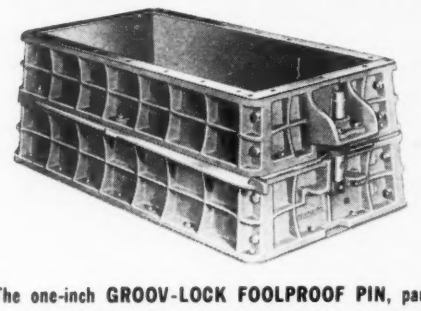
The New

FREMONT SPREADLOCK FLASK



Long-life, easily replaceable, live rubber corner inserts completely close the corner gaps so that no sand can lodge in the open corners.

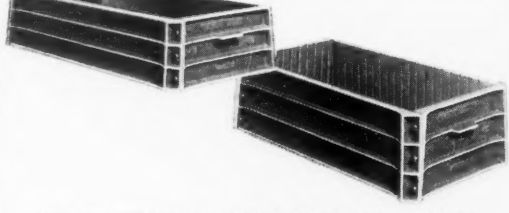
FREMONT STANDARD SLIP FLASK



The one-inch **GROOV-LOCK FOOLPROOF PIN**, particularly adapted to cope or drag pattern jobs, guarantees perfect alignment indefinitely. (Other types of standard pin fittings available.) Solid, bolted and welded corner construction.

FREMONT CAST IRON OR CAST ALUMINUM JACKETS

Save You Real Money!



Precision machined and drilled, bolted corner construction permits easy insertion of new sides or ends. The entire jacket need not be scrapped. Standard style for ordinary foundry practice. Grooved style, which permits ready gas escape, for steel foundries. Glass and jackets can be assembled on 3°, 4°, or 5° taper.

Foundrymen are particular!

but— they're cost conscious, too!

that's why they choose

SULTRON® FLUX

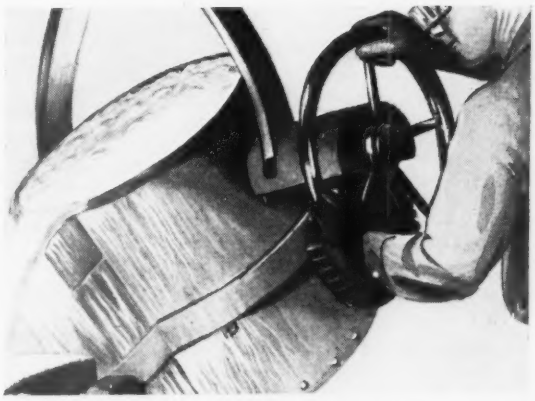
You are particular about the quality of castings that leave your foundry. You know the importance of quality control and spend money to obtain it.

If you find a material for use in your melting process that yields both cost savings and better quality castings—you buy it.

And that's the reason SULTRON, a relatively new fluxing and desulfurizing material, has met with such enthusiastic acceptance in the foundry field.

SULTRON is sold to the foundry industry only by the American Silica Sand Company. It is effective as a desulfurizer in the ladle and fluxing agent in the cupola—and comes in a size that gives better distribution in the charge than most fluxing materials now available. With SULTRON you save on refractory costs because there is less corrosive action. SULTRON doesn't give off toxic gases. Workers can stand close without danger of sparks, gases.

Write for the address of the nearest coast-to-coast representative and warehouse—or take advantage of the free technical service. Traveling foundry technicians will help you with your fluxing problems without obligation.



If you want clean fluid metal with controlled sulfur content, you should try Sultron in your melting process.

American
Silica Sand Co.
OTTAWA, ILL.

Suppliers of: Crude and dried crude silica sand • SULTRON® flux • Australian zircon sand • Zircon flour

®SULTRON is the trademark of Westvaco Chemical Division, Food Machinery and Chemical Corporation, for its brand of sodium sesquicarbonate.

FABREEKA

Under Molding Machines

REDUCES THE EFFECTS of heavy impact shock and destructive vibration . . .

FABREEKA PADS, Bushings and Washers are installed under Molding Machines, Shakeout Machines, Tumbling Barrels and other heavy machinery to reduce the effects of heavy impact shocks and destructive vibration.

FABREEKA has demonstrated its ability to prevent breakage of machine parts and to keep bolts tight, thereby reducing maintenance and increasing production.

FABREEKA has long life, and this important advantage makes its final cost a low cost.

Write for latest literature

FABREEKA

PRODUCTS COMPANY, INC.

222-B SUMMER STREET, BOSTON 10, MASSACHUSETTS

NEW YORK CHICAGO DETROIT SPARTANBURG

PHILADELPHIA PITTSBURGH OAKLAND

Two of five!

Detroit ROCKING Electric Furnaces build long service record—melting bronze for the Jeffrey Company foundry

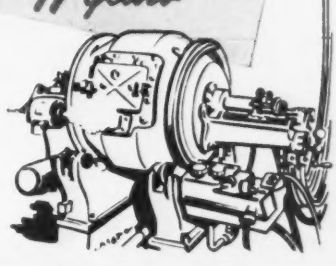
At The Jeffrey Manufacturing Company, Columbus, five Detroit Electric Furnaces have made excellent records melting bronze for worm wheels, bearings, bushings, electrical contacts, and pressure-type castings. In hundreds of other foundries, Detroit Furnaces are doing equally outstanding jobs melting bronze, iron, and steel alloys.

Detroit Rocking Electric Furnaces turn out fast melts of uniform high quality metal. Close control of analysis produces metal of desired analysis time after time, with optimum use of power. The melts are homogeneous, thoroughly mixed by the rocking action of the furnace. Electrodes are free of the molten metal at all times, reducing carbon pick-up to an absolute minimum.

Long life of Detroit Electric Furnaces is documented by such installations as that shown. Economies are proven, too—accomplished by full use of power, less heat loss, reduced metal shrinkage, more heats per day, less metal waste per melt, and reduced out-of-production time because of longer refractory wear and easy shell replacement.

Detroit Rocking Electric Furnaces are tailored to your operating needs. Capacities from 10 to 4000 pounds, for ferrous and non-ferrous melting.

1 350 lb. furnace installed 1925
1 350 lb. furnace installed 1925
1 350 lb. furnace installed 1937
1 700 lb. furnace installed 1941
1 700 lb. furnace installed 1942
average age 17 years



Better melts, faster melts—rocking action does it! Get the facts on what Detroit Rocking Electric Furnaces can do for you! Send us your data now!

DETROIT ELECTRIC FURNACE DIVISION

KUHLMAN ELECTRIC COMPANY, BAY CITY, MICHIGAN

Foreign Representatives: In BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo, CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N. Y., MEXICO: Casco, S. de R. L. Atenas 32, Despacho 14, Mexico City, D. F. EUROPE, ENGLAND: Birlec, Ltd., Birmingham

STANDARD FOUNDRY COMPANY

...proves the economy of the complete line of...

BS&B FOUNDRY FLASKS

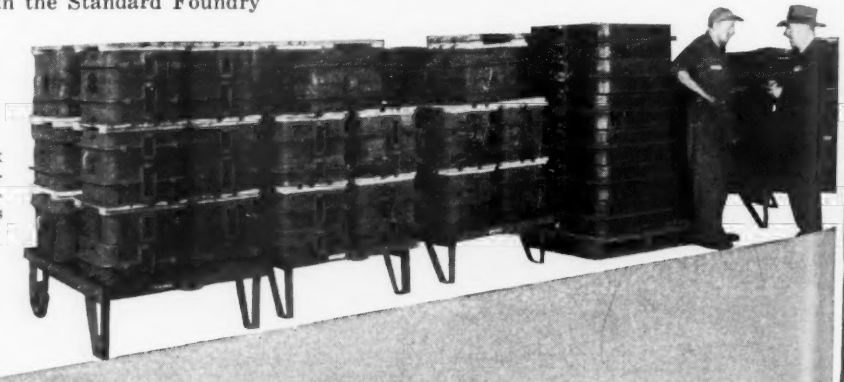
From Small to Heavy Duty

At Worcester, Massachusetts, the Standard Foundry Company turns out a great percentage of the grey iron castings used in the Central New England area.

Several years ago Standard started a major plant expansion. The result is a merry-go-round operation making this jobbing foundry one of the most modern and efficient in the country. Five years ago Standard began using the various sizes of BS&B Foundry Flasks. Performance under continuous, extensive and hard usage daily had already convinced Standard of the economy and low maintenance costs of BS&B Flasks. With plant expansion they needed more flasks. Understandably, they turned to BS&B. Part of the BS&B Flasks delivered recently are pictured here. Different styles of BS&B Foundry Flasks for making small to large castings are in operation in the Standard Foundry

For the tough jobs... the heavy jobs ... It's the BS&B HEAVY DUTY Flask

All types of BS&B Foundry Flasks . . . light, medium and heavy . . . are in extensive use in the foundry industry. Regardless of type, you'll get a tailor made flask, built to the particular requirements of the operation —what you want and need. Your requirements may be for any or all of these types. If yours is a tough, heavy job, we'll recommend the HEAVY DUTY . . . the only flask manufactured combining these three features— (1) Welding of bearing strips, both inside and out; (2) Cast steel trunnions; (3) Cast steel pinlugs and clamp lugs.



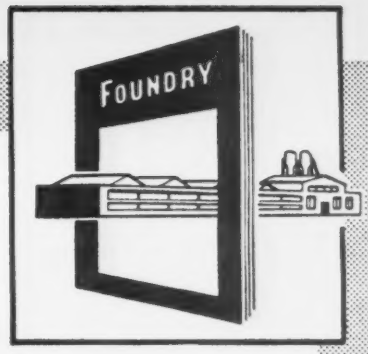
Write Foundry Flask Division 7-AR8 for FREE Handbook

The BS&B Foundry Flask Handbook is a handy catalog containing useful foundry information ... includes easy-to-order system.

FOUNDRY OUR 60TH YEAR BS&B FLASKS

BLACK, SIVALLS & BRYSON, INC.

Kansas City 3, Missouri — 7500 East 12th



Dear Reader:

This page has been provided for your convenience. Use one of the return cards below for more information on advertisements in this issue of **FOUNDRY**.

Write the name of the advertiser and the page number of the ad in the spaces provided. Check the type of information you want. After you have finished going through this issue of FOUNDRY and have jotted down all of the ads on which you'd like more information, just tear out the card, drop it in the mail. We'll do the rest.

Our staff will forward this information to the advertiser immediately so you'll be relieved of the necessity of writing several letters. You'll hear from the advertiser directly, answering your request.

FOUNDRY
Readers Service

FIRST CLASS
PERMIT No. 36
(Sec. 34.9 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio
Readers Service Dept.

Please send further information on the following advertisements in this issue:

PAGE NO.	NAME OF ADVERTISER	Send Technical Data	Send Price Information	Nearest Source of Supply
----------	----------	○	○	○
----------	----------	○	○	○
----------	----------	○	○	○
----------	----------	○	○	○

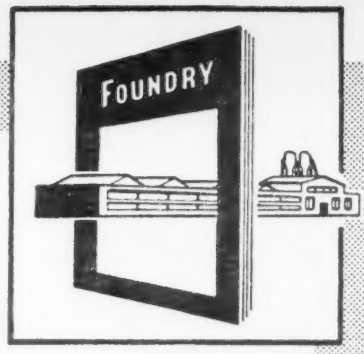
YOUR NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

FDY 8-52



Dear Reader:

This page has been provided for your convenience. Use one of the return cards below for more information on advertisements in this issue of **FOUNDRY.**

Please send further information on the following advertisements in this issue:

PAGE NO.	NAME OF ADVERTISER	Send Technical Data	Send Price Information	Nearest Source of Supply
----------	----------	○	○	○
----------	----------	○	○	○
----------	----------	○	○	○
----------	----------	○	○	○

YOUR NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

FDY 8-52

FIRST CLASS
PERMIT No. 36
(Sec. 34.9 P.L.&R.)
Cleveland, Ohio

BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in the United States

4c POSTAGE WILL BE PAID BY—

FOUNDRY
Penton Building
Cleveland 13, Ohio

Readers Service Dept.

Write the name of the advertiser and the page number of the ad in the spaces provided. Check the type of information you want. After you have finished going through this issue of FOUNDRY and have jotted down all of the ads on which you'd like more information, just tear out the card, drop it in the mail. We'll do the rest.

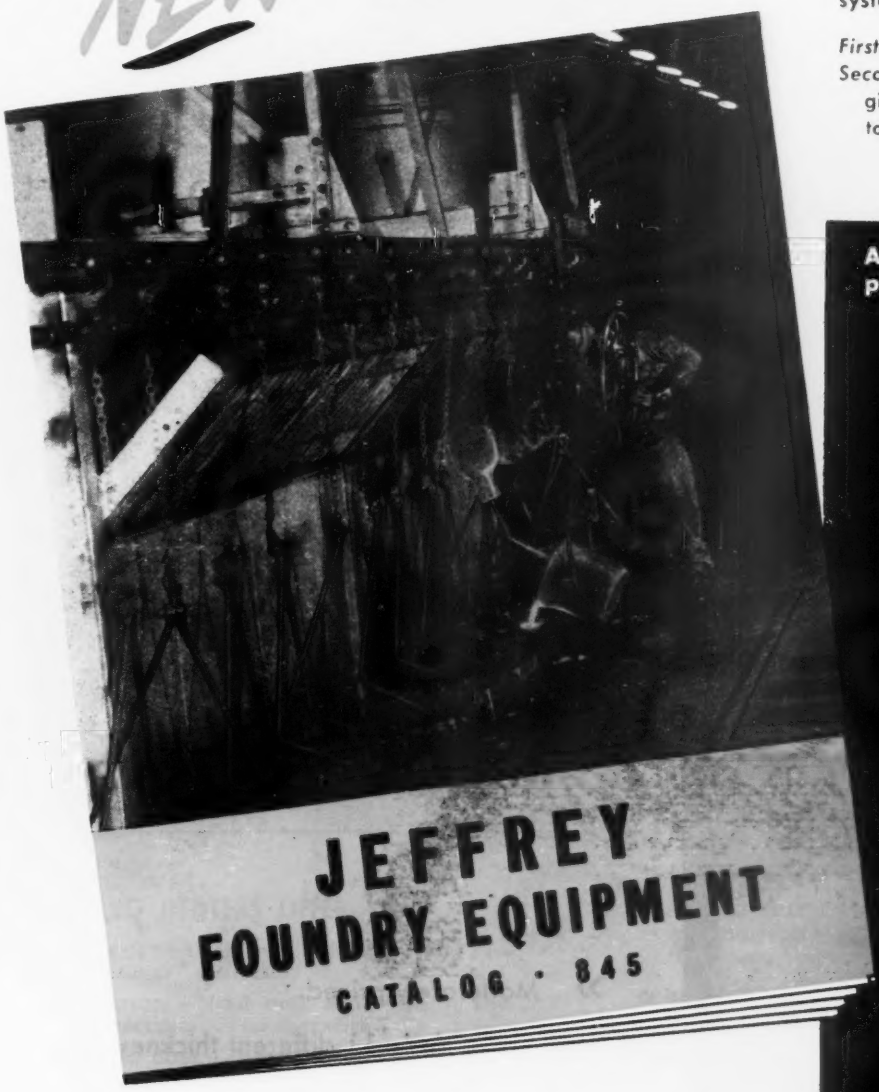
Our staff will forward this information to the advertiser immediately so you'll be relieved of the necessity of writing several letters. You'll hear from the advertiser directly, answering your request.

FOUNDRY
Readers Service

Get this NEW CATALOG!

This 70-page book illustrates and tells how the various types of Jeffrey systems, equipment and machines can be applied to foundry operations, regardless of the size of the job—single unit or complete system.

First—Get a copy of Catalog No. 845.
Second—Consult with a Jeffrey foundry engineer for an accurate analysis and layout to suit your individual conditions.



All of these are described and pictured:

- Aerators
- Belt Idlers
- Bin Gates
- Brass Foundry Handling Systems
- Briquetting Systems
- Bucket Elevators
- Car Unloaders
- Car Spotters
- Castings Handling
- CLEANARATORS
- Coke Handling
- Continuous Pouring
- Conveyors (all kinds)
- Crushers
- Feeders
- Flask Fillers
- Hoppers
- Ladle Pushers
- Measuring Boxes
- Mold Handling and Preparation
- Paddle Mixers
- Pig Mold Conveyors
- Power Scoops
- Pulverizers
- SANDITIONERS
- Sand Preparation and Reclaiming
- Screens
- Valves for Molder's Hoppers
- Transmission Machinery

Also contains a list of some of the many Jeffrey-equipped Foundries

Send Coupon Today

The Jeffrey Mfg. Co.
907 North 4th St. Columbus 16, Ohio

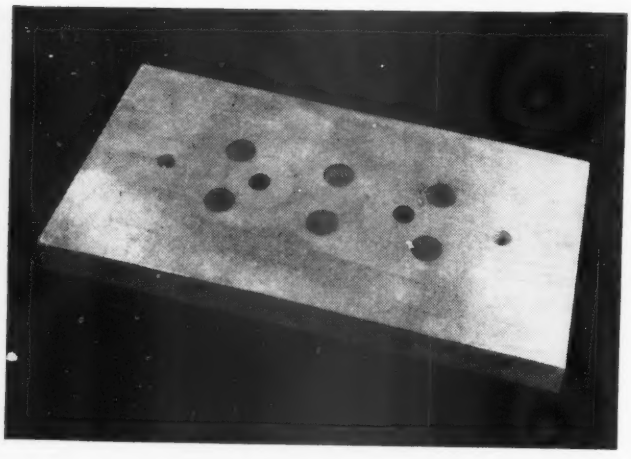
Please send me Catalog No. 845:

Name_____ Position_____

Company_____

Address_____ City_____ State_____

Core Blower Plates made of **Alcoa** Aluminum Tool and Jig Plate* **cost at least ½ less** than those made of other materials. The same is true of Cope and Drag Plates.



- Moderately priced.
- Available in 11 different thicknesses from ½" to 4".
- Available from stock—cut to any thickness up to 48" x 96".
- Strain relieved—machined both sides—thickness held to ± .010".

ALCOA

TOOL AND JIG PLATE

**For more information on Alcoa Tool and Jig Plate, contact your local Alcoa sales office... or write ALUMINUM COMPANY OF AMERICA, 1949-H Gulf Building, Pittsburgh 19, Pa.*

HERE'S YOUR PROOF OF . . . .

DRAVO *Counterflo* HEATER VERSATILITY!

get these FREE case studies now!

Detailed information and photographs show how heaters can be adapted for tempering make-up air . . . or how de-fogging of a plant may be accomplished using Dravo Heaters. These case studies give you proof of Dravo Heater versatility, and they're yours for the asking.

DRAVO HEATERS OFFER YOU:

LOW INITIAL COST—Users report 30% to 60% savings over "wet-type" systems.

EASY INSTALLATION—Need only fuel, exhaust and electrical connections . . . no ductwork.

LOW OPERATING COST—Direct-fired . . . burn gas or oil . . . readily converted . . . minimum efficiency 80%.

AUTOMATIC OPERATION—On-off or modulating controls . . . no constant attention needed.

LONG SERVICE LIFE, LOW MAINTENANCE—Stainless steel combustion chamber eliminates refractory lining.

SAFETY—Approved by American Gas Association, listed by Underwriters' Laboratories, Inc.; Dravo standardized safety control circuit accepted by Factory Mutual Engineering Division.

MOBILITY—Can be moved to any location.

FLEXIBILITY—When floor space is limited, can be wall-hung or suspended from trusses in any position.

DRAVO HEATERS SOLVE HEATING PROBLEMS IN THESE INSTALLATIONS, TOO:

- **PROCESS DRYING AND HEAT CURING**—where moisture content must be controlled or removed from air, and temperature regulated to meet production needs.
- **HEATING AND VENTILATING STORES, SCHOOLS, AUDITORIUMS, AND LARGE BUILDING AREAS**—where quick, automatically controlled, low-cost heating is desired.
- **TEMPORARY HEATING**—where comfort heat is necessary during building construction or to keep ground temperature above freezing in winter.

FOR FREE CASE STUDIES OF INTEREST TO YOU

MAIL THIS COUPON TODAY . . .

(Case Study sheets are 8½" x 11", punched for binder or convenient filing.)

HEATING DEPARTMENT, DRAVO CORPORATION
Dravo Building, Fifth and Liberty Avenues
Pittsburgh 22, Pa.

Please send me the following case studies FREE:

- ☐ Process drying and heat curing
- ☐ Space heating large buildings
- ☐ Tempering make-up air
- ☐ Temporary heating
- ☐ Stores, schools and auditoriums
- ☐ Please have a representative call.

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

When writing ask for Bulletin DE-523-1324

DRAVO
CORPORATION

PITTSBURGH • ATLANTA • BOSTON • CHICAGO • CINCINNATI CLEVELAND • DETROIT • NEW YORK • ST. LOUIS • PHILADELPHIA WASHINGTON

Sales Representatives in Principal Cities

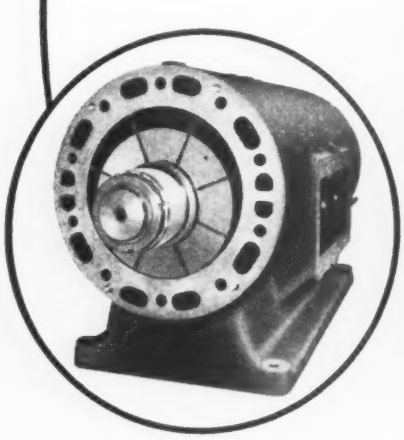
Manufactured and sold in Canada by Marine Industries, Ltd., Sorel, Quebec. Export Associates: Lynch, Wilde & Co., Washington 9, D.C.

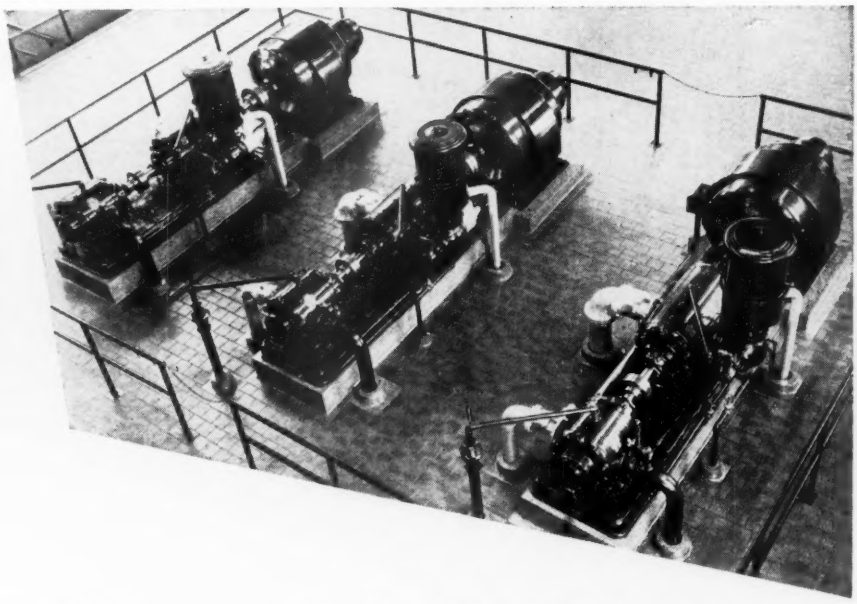
FULLER ROTARY COMPRESSORS

ELIMINATE . . .

Complicated, Moving Parts . . .

for economical operation





Fuller Rotary Compressors are designed and built to be dependable and economical in operation . . . to give a lifetime of new machine service. They have but few moving parts—rotor, bearings, and blades. That means minimum maintenance and infrequent inspection. Because blades automatically compensate for wear, *full capacity is maintained for the life of the machine.* Every detail in Fuller compressors is engineered for one purpose . . . to give you the best machine money can buy.

Thousands of Fuller Rotary Compressors are maintaining peak efficiency in plants of every size and description throughout the country. They've *earned* their reputation for complete dependability.

Fuller engineers will be glad to work with you for the proper application of Fuller compressors to your particular requirements. Bulletin C-5 gives you complete information on these quality built compressors. You'll want to study it carefully . . . see how well Fullers fit into your own plans and operations.

Fuller

DRY MATERIALS CONVEYING SYSTEMS AND COOLERS
COMPRESSORS AND VACUUM PUMPS
FEEDERS AND ASSOCIATED EQUIPMENT

FULLER COMPANY, Catasauqua, Pa.
120 So. LaSalle St., Chicago 3
420 Chancery Bldg., San Francisco 4

C-216

Mixes and tempers 1½ tons of sand a minute... *with help of TIMKEN® bearings*

THIS Clearfield sand mixer can mix and temper a ton and a half of foundry sand a minute. It's a tough, grueling job. But this mixer can take it. It's been on the job for fifteen years in a Pittsburgh district foundry. One big reason for its stamina: Timken® tapered roller bearings on the mixer pan, muller wheels and unloading disk. And the original Timken bearings are still going strong.

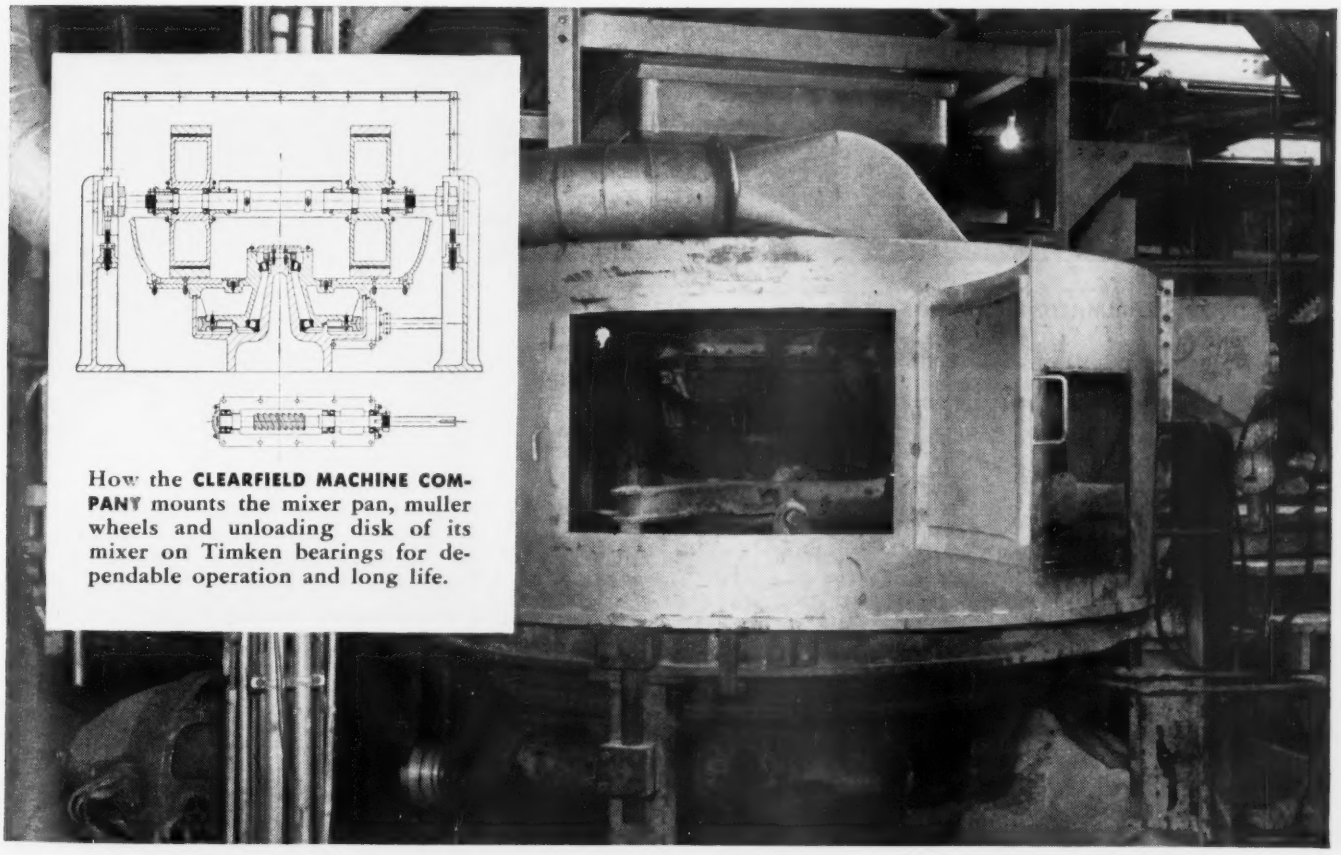
With the mixer pan on Timken bearings, the heavy weight of the sand is carried with ease. Dependable operation is insured, breakdowns prevented. Timken bearings help the unloading disk and muller wheels rotate freely, holding wear and power consumption to a minimum.

Tapered construction of Timken bearings permits them to take the radial and thrust loads in any combination. Line contact between rollers and races in Timken bearings gives them load-carrying capacity to spare. Their true rolling motion and smooth surface finish practically eliminate friction. And, highly important in foundry sand applications, Timken bearings keep housings and shafts concentric, make closures more effective. Lubricant stays in, reducing maintenance—sand and dirt stay out, reducing wear.

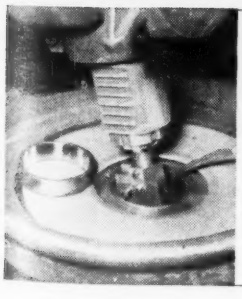
No other bearing can give you all the advantages you get with Timken bearings. Make sure you have them in the equipment you buy or build. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN BEARING EQUIPPED

This symbol on a product means its bearings are the best.



How the **CLEARFIELD MACHINE COMPANY** mounts the mixer pan, muller wheels and unloading disk of its mixer on Timken bearings for dependable operation and long life.



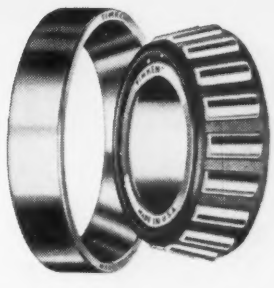
FINISHED TO CLOSER TOLERANCES

Finishing to incredible smoothness accounts for much of the precise, smooth rolling performance of Timken bearings. This honing operation is typical of the amazingly accurate manufacturing methods at the Timken Company.

The Timken Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TAPERED ROLLER BEARINGS



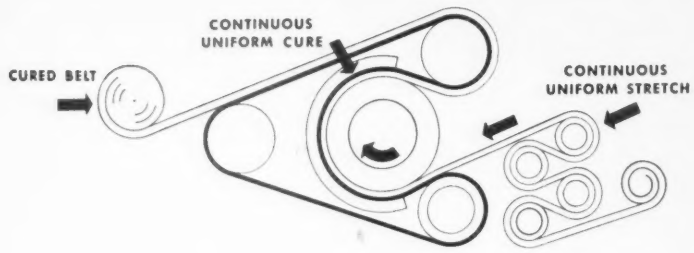
NOT JUST A BALL — NOT JUST A ROLLER — THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

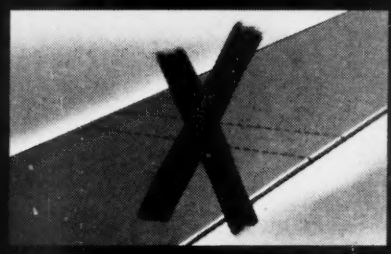
Like "Whodunits"?

Many Engineers Have Solved the Mystery of Early Conveyor Belt Failure — They Specify

BWH Rotocured Belts (and prevent OCS*)

DIAGRAMMATIC SKETCH OF EXCLUSIVE ROTOCURE PROCESS





*Overcured Sections — segments 2" to 4" wide present every 30' to 40' in all belts made by the flat press method.

Early failure of many conveyor belts is no "mystery" when you realize the limitations of conventional flat press curing compared to BWH Rotocuring. Flat press belts "carry the seeds of their own destruction" because they are cured by a process of press overlaps which weaken the structure. Each cured section in this process advances less than a full press length, hence segments receive a *double* curing.

BWH ROTOCURED BELTS *cannot* come to you with these weakened sections because they are made by an entirely different process. We call it "ROTOCURE" — you'll call it "a definite cost saver"! Actually it's a process of continuous, endless, constant motion curing. Because there are no press overlaps, there are no weak segments.

Users with the toughest conveying problems who have switched to BWH Rotocured Belts are getting more service and performance for their money in:

1. **Stepped-up belt flex life (up to 40%)**
2. **Elimination of mechanical distortion at the press ends**
3. **Constant, uniform stretch**
4. **Uniform, abrasion-resistant covers**

Your BWH distributor is a specialist who knows how to put these advantages to work on *your* conveying problems . . . ask him *in* — and ask him also about BWH Transmission Belts. (They operate at lower tension and hence last longer).

BWH
DEPENDABLE RUGGEDNESS

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Warehouse Stock: 111 N. Canal St., Chicago, Illinois **Distributors in all Principal Cities**

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

Call for Republic's Pig Iron Metallurgist

We don't guarantee his versatility with a coffee pot, but when it comes to a foundry pouring problem, you can expect prompt, effective help from the Republic Pig Iron Metallurgist.

His knowledge of foundry operations is based upon a combination of metallurgical training and actual foundry experience . . . years of it. He knows how and why irons behave as they do at different temperatures . . . knows what to do, within equipment limitations, when problems upset the profit picture.

You can trust this man to respect your confidence, too, just as he has for hundreds of other foundries—large and small. His only obligation is to you . . . to help solve your problems in the fastest, most efficient way possible.

There is no charge for the services of the Republic Pig Iron Metallurgist. Just write, wire or phone and you'll hear from him promptly.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N.Y.

Republic PIG IRON

"CHATEAUGAY" Low-Phosphorus, Copper-Free

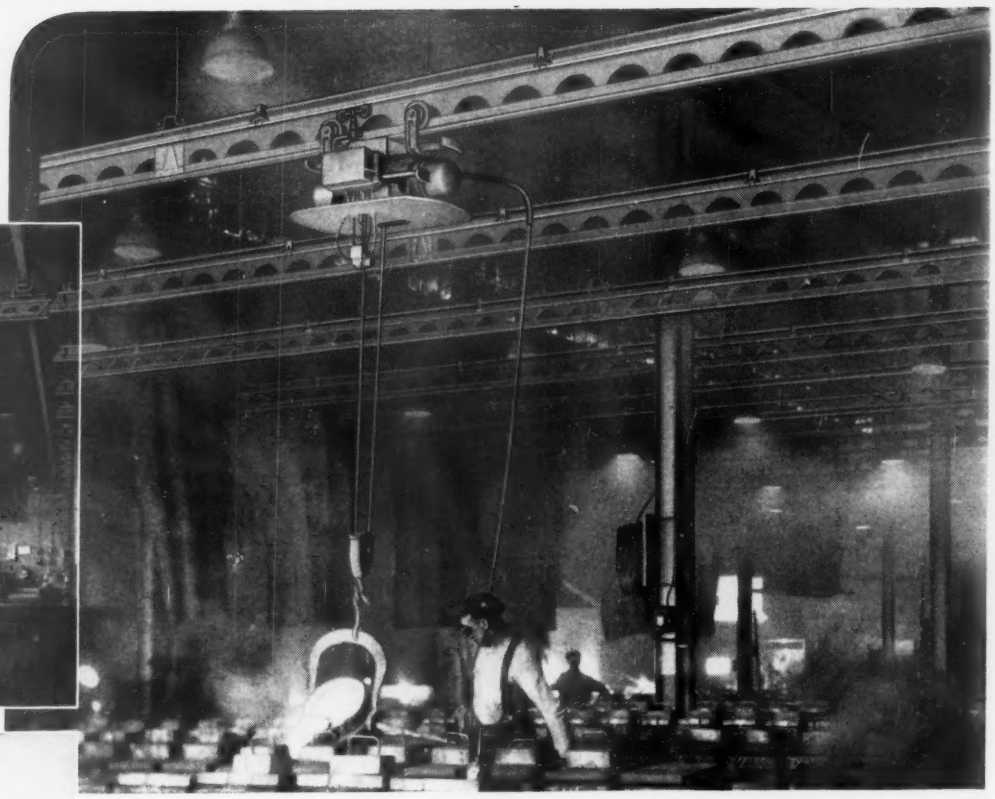
"REPUBLIC" (Northern) Foundry, Basic and Malleable

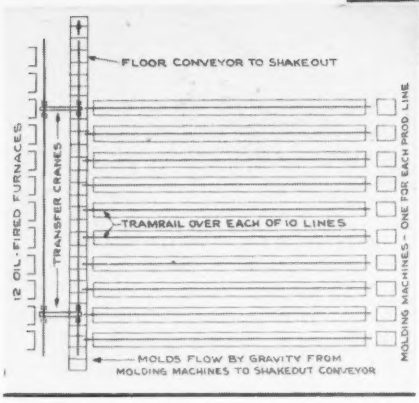
"PIONEER" (Southern) Foundry and Basic

REPUBLIC STEEL

This installation is at CRANE LIMITED, Montreal, P. Q.

This transfer crane interlocks with any of the 10 tracks over the conveyor lines enabling fast direct delivery of metal from any of the 12 oil-fired furnaces to any mold on any line.




12 OIL-FIRED FURNACES
TRANSFER CRANES
FLOOR CONVEYOR TO SHAKEOUT
TRAMRAIL OVER EACH OF 10 LINES
MOLDING MACHINES - ONE FOR EACH PROD LINE
MOLDS FLOW BY GRAVITY FROM MOLDING MACHINES TO SHAKEOUT CONVEYOR

16 tons of small brass fittings are poured in a 9 hour day with this hand-propelled Cleveland Tramrail equipment. Hoists are electric of 1000 lb. capacity.

Speeds Brass Fitting Production With Continuous Straight-Line Foundry Layout

Because of an efficient straight-line production layout, small brass fittings are made in large quantities at minimum cost in the foundry of Crane Limited, Montreal. The arrangement reduces manual handling to the least possible.

There are 10 production lines, each of which is served by a molding machine. The molds ride on dollies that travel down the lines by gravity. Over every line is a Tramrail track on which hot metal is conveyed directly to the molds from the furnaces. After a line has been poured, the molds are permitted to advance to the end of the line where a mechanism dumps the sand and castings onto a continuous conveyor, set flush with floor, which serves all 10 lines and carries the materials to shake-out. Empty dollies are returned to molder at opposite end via a track on lower deck of production line.

The foundry is in continuous operation. Every man is kept busy at his particular job. No time is lost shifting from one operation to another. Because of the flexibility of Tramrail equipment hot metal can be delivered quickly from any furnace to any mold, thus metal heat loss is kept low.

Look into the possibilities of boosting your foundry efficiency with Cleveland Tramrail. A qualified engineer will be glad to discuss foundry handling with you without obligation.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3836 East 286th St., Wickliffe, Ohio

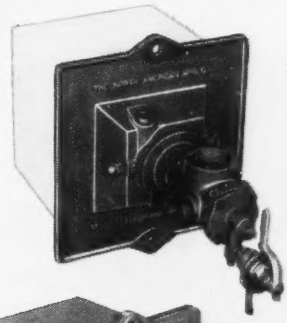
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Here to stay.. DUAL-FUEL* BURNERS

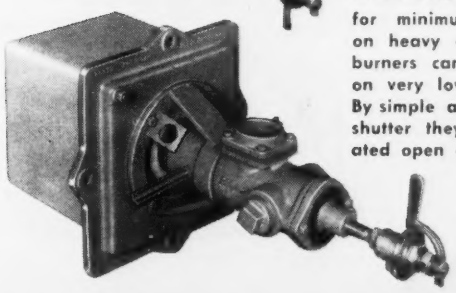
PIONEERED IN 1917 BY

North American

LUMINOUS OR LONG FLAMES
with either gas or oil are produced by the Series 113 Burners. They are desirable for vast coverage, for fewer burners and for uniformity of flame temperature.



SHORT FLAMES
are produced by the Series 221 Burners. These burners provide a highly stable and efficient fire, using either gas or oil. They are recommended wherever heating in a relatively small space is required.



RUGGED DESIGN
for minimum maintenance on heavy oil. Series 225 burners can also be used on very low gas pressure. By simple adjustment of the shutter they can be operated open or sealed-in.

COMPLETE SYSTEMS for GAS and OIL

Maximum Efficiency
with Either Fuel

Switch Fuels
Instantly

Automatic
Fuel-Air Proportioning

Wide Turndown Range

Seven Burner Styles
to fit any Type of Application

★ Dual-Fuel: The North American name for burners designed especially for both gas and oil. Fuel changed by merely turning valves.

THE NORTH AMERICAN MANUFACTURING COMPANY
MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL
BRANCH OFFICES *with* FIELD ENGINEERS *in* PRINCIPAL CITIES
CLEVELAND 5, OHIO

USCO -2

Looking for lower alloy costs? Select USCO D-2! This is an all-purpose 4% Cu 3% Si aluminum alloy, and like all USCO products, it is produced under our famous Production Control System . . . has been job tested and approved. A few of its advantages are: good castability—excellent machining and finishing properties—less shrinkage. Ask your USCO salesman about D-2 now.

FREE USCO Aluminum Alloy Selector. A handy aid to analysis, specifications and many other foundry problems.

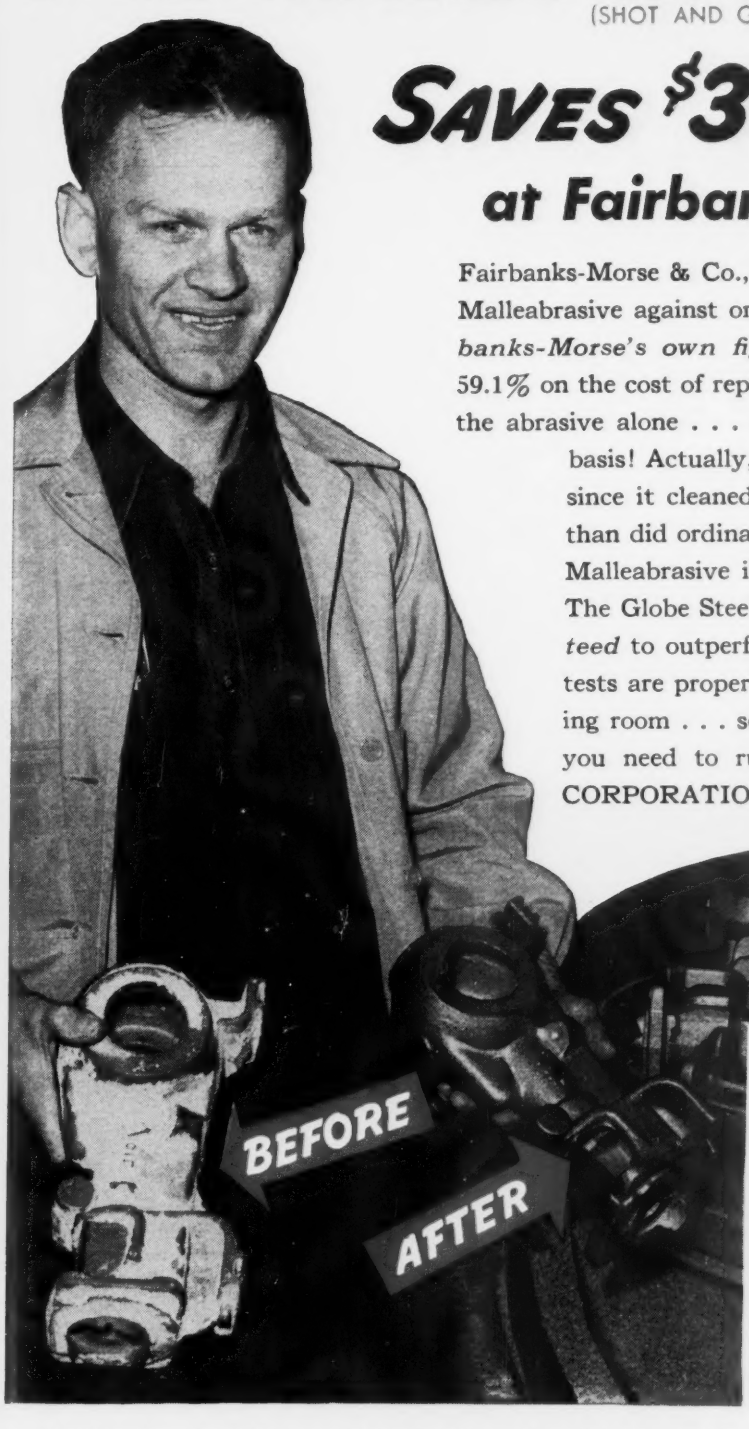
For 48 years, pioneers in aluminum development.

USCO **U. S. REDUCTION CO.**
East Chicago, Indiana

PLANTS: EAST CHICAGO, INDIANA • TOLEDO, OHIO

MALLEABRASIVE®*

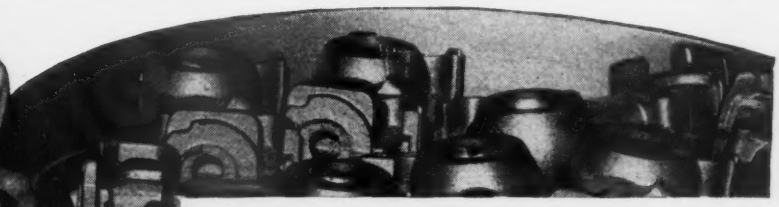
(SHOT AND GRIT)



SAVES $3450.00 A YEAR at Fairbanks-Morse & Co.

Fairbanks-Morse & Co., Freeport, Ill., took us up on our offer to test Malleabrasive against ordinary grit in their own shop. Here are *Fairbanks-Morse's own figures:* During the test, Malleabrasive saved 59.1% on the cost of replacement parts . . . saved 14.6% on the cost of the abrasive alone . . . adding up to a total of $3454.40 on a year's basis! Actually, Malleabrasive's advantages are even greater, since it cleaned an average of 10.8% more tonnage per hour than did ordinary grit!

Malleabrasive is the *original* long-life abrasive pioneered by The Globe Steel Abrasive Co., Mansfield, Ohio. It is *guaranteed* to outperform ordinary shot and grit when comparative tests are properly run. Test Malleabrasive in your own cleaning room . . . send for your free kit, containing all the forms you need to run this impartial test. Write: PANGBORN CORPORATION, 1400 Pangborn Blvd., Hagerstown, Md.



Here's why Malleabrasive saves you money:

MALLEABRASIVE

- *is designed for modern cleaning equipment*
- *wears out fewer machine parts*
- *lasts 2 to 4 times longer*
- *reduces machine down-time*
- *reduces cleaning costs up to 50%*
- *increases output of cleaned castings*

Packed in orange striped 100-pound bags with this tag

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn

BLAST CLEANS CHEAPER
with the right equipment for every job

*U. S. Patent #2184926 (other patents pending)

"FALLS BRAND" ALLOYS
AMERICA'S LARGEST PRODUCERS OF ALLOYS

"FALLS" TITANIUM ALUMINUM

When added to aluminum-copper and aluminum-silicon, alloys will dissolve readily at ordinary foundry melting temperatures. It has a favorable influence on the grain-size and structure and will promote the following properties:

... Increase tensile strength and ductility.

... Increase fluidity.

... Increase resistance to pressure so that castings will hold liquids without leakage.

... Improves polished and machined surfaces due to decreased subsurface pinholes and porosity.

"FALLS" Titanium Aluminum produced in most convenient size ingot for weighing small quantities, is recommended for addition to molten aluminum alloy just before it is poured into the mold.

WRITE TO US FOR DETAILED INFORMATION

NIAGARA FALLS
Smelting & Refining Division
Continental Copper & Steel Industries, Inc.
BUFFALO 17, NEW YORK

Readers' COMMENT

Why We Export Scrap

TO THE EDITORS:

I have read with interest the editorial in the June issue of FOUNDRY.

While, at the present time, iron and steel scrap is in good supply, the steel mills and foundries across the country having approximately 60 days supply on hand, I fully appreciate the fact that overall this country faces a scrap shortage. This shortage very likely may be of many years' duration if our mills and foundries are to operate at close to capacity. I can understand your concern regarding the exportation of scrap from the United States and possessions. The only scrap legally permitted to go out of this country, with the exception of the small tonnages allowed to our neighbors Canada and Mexico, consists of a small amount of unstripped motor blocks to the United Kingdom.

Some months ago the United States reached an agreement with Great Britain whereby we would export approximately one million tons of ingots and/or scrap in return for some very badly needed aluminum from Canada. The motor blocks which the British government is being given permission to buy from outlying areas only and for which export licenses have been issued, will constitute part of the total allotment to the United Kingdom.

Parenthetically I would like to call attention to the fact that when we export ingots we lose a considerable amount of scrap, as 25 per cent of the ingot is lost in converting to finished steel and then approximately 13 per cent of the finished steel is lost; this percentage becoming production scrap.

It is well known that we were suffering acutely from the shortage of aluminum and the government felt that this country would profit by the exchange of steel ingots or scrap for the increased amounts of Canadian aluminum. I would like to emphasize that we have gained badly needed aluminum in exchange for the ingots and a small tonnage of motor blocks sent to the United Kingdom.

As you know, motor blocks have been piling up, particularly in outlying areas, ever since about the first of the year. Because it now appears

(*Concluded on page* 82)

A regular "busybody" around your plant

Sticks Its Nose into Any Material-Handling and Excavating Work . . . And Gets the Job Done Fast

Allis-Chalmers HD-5G

1 cu. yd. Bucket, 40 drawbar hp. Dumping Height — 9 ft., ¼ in.

Interchangeable attachments include: Special buckets — up to 2-yd . . . Bulldozers for excavating and backfilling . . . Crane Hook for heavy lifting . . . Lift Fork for handling palletized loads . . . Trench Hoe for footings, pipe — other trenching.

Foundry Sand — Wades Right Into Any Stockpile — Indoors or Out

. . . scoops out and carries a full cubic yard at a pass. Only a crawler tractor gives you the traction and power you need for tough digging as well as material handling . . . and the flotation for really heavy going. And only this A-C crawler gives you an extra, fast reverse to increase output, plus 1,000-hour lubrication of truck wheels to save you 30 minutes' greasing time every day.

Coal — Stores, Compacts and Reclaims

This flexible unit can build stockpiles in any available space. Abili.y to spread and pack coal in thin, horizontal layers eliminates flues — the main cause of spontaneous combustion. Standard track shoe eliminates coal breakage. As coal is needed, the HD-5G quickly loads from stockpile to trucks. On short hauls, it dozes or carries coal directly to plant.

Waste — Cleans Up and Loads

Out in the yard, this busy tractor cleans up and loads industrial waste, excavates, trenches and backfills on new construction, spots cars, clears snow . . . handles many other jobs winter and summer.

Now . . . to meet the challenge of ever-increasing production demands, Allis-Chalmers multiplies its scope of tractor usefulness even more. And here's how. The same basic design . . . the same versatility that make the HD-5G Tracto-Shovel so useful is now available on all four models of modern Allis-Chalmers tractors.

1-Yd. HD-5G	2-Yd. HD-9G	3-Yd. HD-15G	4-Yd. HD-20G
40 drawbar hp.	72 drawbar hp.	109 drawbar hp.	Torque Converter Drive 175 net engine hp.

Write for free literature in the Tracto-Shovel line.

ALLIS-CHALMERS

TRACTOR DIVISION · MILWAUKEE 1, U. S. A.

Railmaster 3-ton crane serves the paint shop area and interlocks via track curve with crane serving the sand blast room. Interlocking track is equipped with opener to allow fire door closure.

Track and switches with spur tracks over welding booths for easy spotting of heavy loads in booths.

Compact track and crane system over the electrical shop area. Note hand chain drop section on extreme left, which lowers a hoist carrier for service or repair.

MONORAIL REDUCES *Maintenance Costs*

In this, one of the country's largest maintenance shops, American MonoRail Overhead Handling Equipment serves the entire department. Included in the department are: machine shop, electrical repair, metalizing room, welding, painting and sand blast room, pipe shop, and inside and outside storage. This plant has shown a definite increase in efficiency and a great reduction in handling costs.

Let an American MonoRail engineer show you how you can cut handling costs and save valuable floor space.

WRITE FOR C-1 BULLETIN

THE AMERICAN MONORAIL COMPANY

13104 ATHENS AVENUE • CLEVELAND 7, OHIO

(*Concluded from page* 80)

that the market for this form of scrap has declined we are discontinuing Order M-92.

ROBERT WARNER
Special Assistant to the Administrator
In charge of Salvage Operations
Defense Production Administration
Washington 25

* * *

What Makes a Foundry Tick

TO THE EDITORS:

Every time someone asks me a "stupid" question about a foundry, I want to set them straight. However, educating one person at a time is a tedious operation, so I have undertaken a project of my own to educate the people in our own company concerning a foundry.

We are mainly a machine tool industry, making printing presses and paper cutters, with some limited jobbing work at the present time. What I would like to do is acquaint the whole factory with the knowledge of what makes a foundry tick and how castings are made. The method I have planned is to write a series of articles in the company magazine, telling people about the foundry industry.

My writing will be guided by the many questions that have been asked of me, such as one article that appeared in June FOUNDRY under the heading of "Adventures of Bill." When reading this column, I was reminded many times of such questions as he was asked.

The information I would like to have concerns the number of foundries and their location in the United States. This information will be used as a starter in the series of educational articles.

H. J. GONYA
Industrial Engineer
1325 *Xenia Ave.*
Dayton, O.

* * *

Editorial Should Be Read

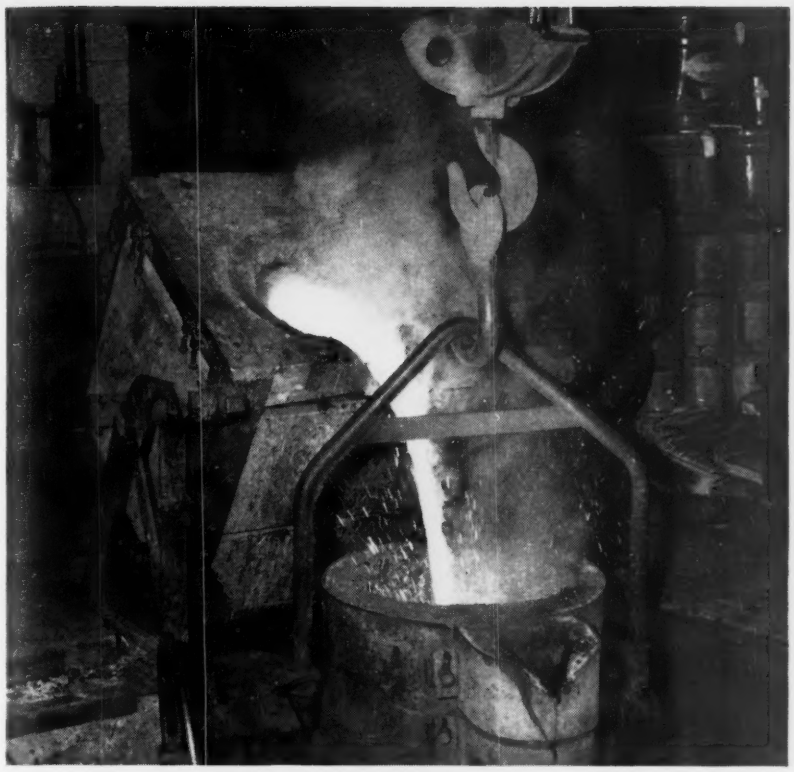
TO THE EDITORS:

I have read your editorial page for several years. I have enjoyed the FOUNDRY for a longer period, but I want to tell you that the editorial page is really getting good. Now the problem is getting more people to read it.

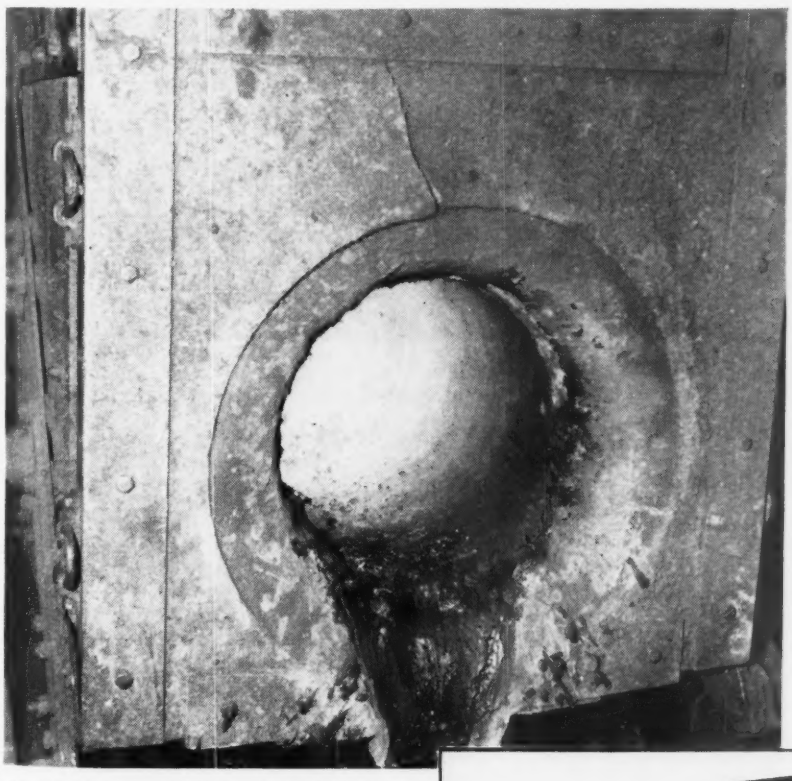
If you have reprints of the July issue editorial, will you kindly send me three copies for our Congressmen?

Thanks again for a fine page and your contribution to the industry.

F. E. FOGG
Vice President
Acme Foundry & Machine Co.
Coffeyville, Kans.



HIGH ALLOY STEEL is being poured here from a 1000-lb. high-frequency induction furnace. It is lined with a Norton MAGNORITE* refractory cement which lasts 16% longer than the cement previously used.



CLOSE-UP OF THE SAME FURNACE, taken immediately after metal has been poured, shows how effectively this engineered-to-the-job Norton MAGNORITE cement resists mechanical and chemical attack.

How much more steel will you melt per lining *with Norton MAGNORITE cements?*

It's easy to find out how much longer Norton MAGNORITE refractory cement will last in your high-frequency furnaces than your present linings. Just call on the 40-year problem-solving experience of Norton Refractory Research which gave this satisfied customer (name on request) 16% longer lasting linings.

Whether you melt straight steel or heat-resistant compositions, you'll get a Norton MAGNORITE cement that's engineered to fit your exact requirements. It will withstand temperatures up to 3250 F. if need be. It will have a high-rammed density that offers great resistance to metal penetration, erosion and chemical attack . . . and freedom from shrinkage cracks that often lead to furnace failure. Why not run a test on one of your furnaces soon?

Whatever your metal-melting problem, you can depend on Norton Research to help you. Working with MAGNORITE, ALUNDUM*, CRYSTOLON* and FUSED STABILIZED ZIRCONIA cements and special shapes, Norton engineers are sure to come up with the right answer for you.

For full details about Norton special, engineered refractories, contact your nearby NORTON refractories engineer, or write to NORTON COMPANY, 305 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

NORTON

Special REFRACTORIES

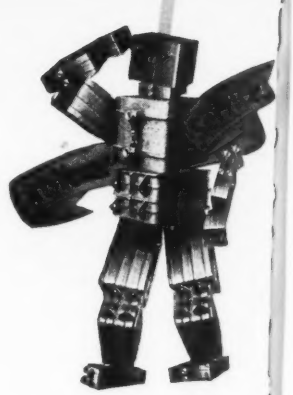
Making better products to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

Another Malleable Foundry Prefers STERLING Flasks!

Here are some of the 600 sections of Sterling Type "L" Steel Flasks purchased recently, in a single order, by a large Midwestern malleable foundry. The flasks are being used for producing automotive castings. The same foundry also formerly purchased 1,100 sections of other styles of Sterling Steel Flasks. Sterlings were selected because of their greater accuracy and longer life. All-steel . . . all-welded . . . each section is fabricated into one solid, rigid piece . . . capable of withstanding tremendous pressures. The *heavy special rolled steel* sand flanges provide a full-width bearing that permits partings to be accurately machined — not just surface ground, but planed to an accuracy within .005". These features, plus the solid center rib and angle reinforcement assure longer flask life and a more profitable investment. When in need of flasks, or other foundry equipment, consult Sterling. Write for catalog.

STERLING WHEELBARROW CO. • MILWAUKEE 14, WIS. U. S. A.



Sterlings are backed by a most a half century of "know how" in fabricating precision built foundry flasks.

A 7210-1P

Try First Things First

THE June 30 issue of "Machine Tool Progress," published by the Machine Tool Builders' Association, presents a forceful criticism of the treatment which that industry has received in Washington during the present emergency. The industry has been unable to maintain efficient production schedules or keep its trained employees, due to the on-again-off-again policy in ordering machine tools. Recently a second stretchout in defense production schedules, which follows a spree of over-ordering, has brought cancellations of machine tool orders to the highest point since the end of World War II. Cancellations were 45 per cent of new orders in May, and 34.5 per cent for the first five months of 1952. Lack of concern earlier in the defense effort in building up capacity for the machine tool industry also is criticized.

Indifference of Washington planners to the importance of machine tools and allied equipment in the defense program is quite in contrast to the situation during World War II. From the time that William Knudsen began organizing for war production in 1940, everybody from the President on down recognized the basic character of machine tools and did everything possible to break the machine tool bottleneck. Much can be said about the intelligent leadership of Mason Britton, George Brainard, George Johnson and John Chafee, who served as chiefs of the Tools Division at various times during the emergency period, in seeing that the machine tool industry was provided with orders, materials, top priorities and other assistance. These men and their numerous able assistants also recognized the importance of other industries to the building of machine tools, and many of them, including foundry equipment and supplies, were accorded the same status in the priority setup as machine tools.

Of course, mistakes were made by the old Tools Division, and the tremendous demands for tools made the supply tight throughout most of the war. Nevertheless, this experience of the division provided a fund of knowledge which could have been used as a starting point in the present defense production program. This experience was not utilized in the present emergency and, as a result, the machine tool industry has been seriously handicapped in serving the defense effort.

Some day Washington planners should awaken to the importance of the machine tool industry in defense and utilize past experience as a guide to enable that industry to function to maximum efficiency. When that time comes, it is hoped that the defense agency also will recognize the necessity of the various components, including castings, which are used in building tools. And because foundry equipment and supplies are important adjuncts to castings production, these machines and materials should be given top priority assistance under the defense setup handling machine tools.

Frank G. Steinebach
Editor

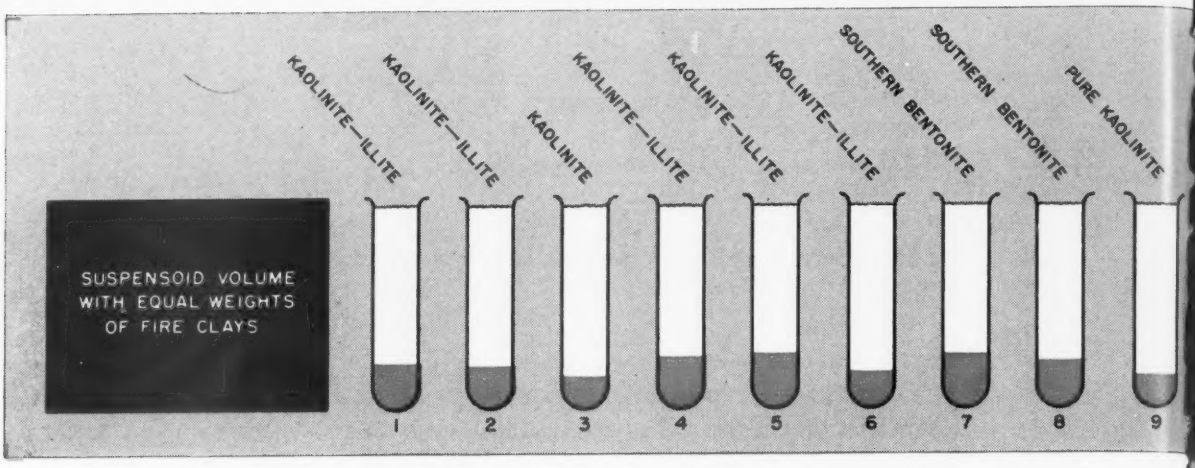


Fig. 1—Showing variation in settling power of several different clays shaken with water and allowed to settle for two weeks

Selection, Testing and Use of . . . Bonding Clays in Synthetic M

FROM the standpoint of the practical foundryman, the difference between rebonding clays and the type of bond found in natural bonding sand is reflected in the changes he usually has to make in order to use the former. Briefly, these differences are:

1. In a natural unblended molding sand the clay bond is uniformly distributed and can be incorporated in a foundry mixture much easier. When using a concentrated bond any form of mixing less drastic than mulling is found to be inefficient and usually unsatisfactory.

2. Rebonding clays are usually of higher purity than the bond in molding sands, although this does not necessarily indicate that they have better life than the bond found in some natural sands.

3. Continued use of rebonding clays can result in accumulation of fines unless certain precautions are taken. Sometimes more fines are accumulated because less sand is wasted. This problem need not always be attacked by expensive equipment for fines removal but by merely starting with a base sand that is low in silt and fines so that the natural accumulation of fines will give a heap of similar screen analysis to a successful natural molding sand.

4. Facings using the most highly concentrated bonds, such as western bentonite, usually require less moisture to temper them than those made from natural bonding sand. The more highly plastic clays are more efficient and contain less fines and silt than many molding sands. The lower and narrower tempering range can sometimes be disadvantageous by giving a crumbly structure to the green mold when the molder wants to tool it after removing the pattern. A well made mold should not need repair.

The successful introduction of a synthetic or manufactured sand system usually has to overcome one or more of the above problems.

Any generalization of what constitutes a good bonding clay is liable to get one involved in technicalities that would be meaningless to the purpose because they would suggest tests that are not readily available to the average foundry. To illustrate, several generalizations will be mentioned which have needed modification:

I. Chemical Analyses—Advocates of chemical analysis may state that the mineral kaolinite, which is the double silicate of alumina ($Al_2O_3 - 2\ SiO_2 - 2\ H_2O$) is the material that furnishes the strength in bonding clay. There are a number of exceptions and among these are (a) bentonite, which is an entirely different mineral and is one of the most efficient bonding agents, and (b) china clay, which is almost pure kaolinite and is a relatively poor bonding agent for sand.

On the other hand, many of the plastic fire clays that closely resemble the analysis of kaolinite (SiO_2 — 45 per cent; Al_2O_3 — 38½ per cent; H_2O — 13½ per cent) show good bonding properties. Others of higher silica content may be mixtures of complex silicates and kaolinite which may or may not be good bonding clays. In general, if the clay contains silicious impurities, it detracts from the bonding properties but these constituents are quite hard to separate and are beyond the scope of the average foundry to analyze.

Using an analogy with which foundrymen are familiar, it can be said that the chemical analysis of a clay means just about as much as does the chemical analysis of cast iron to its physical properties.

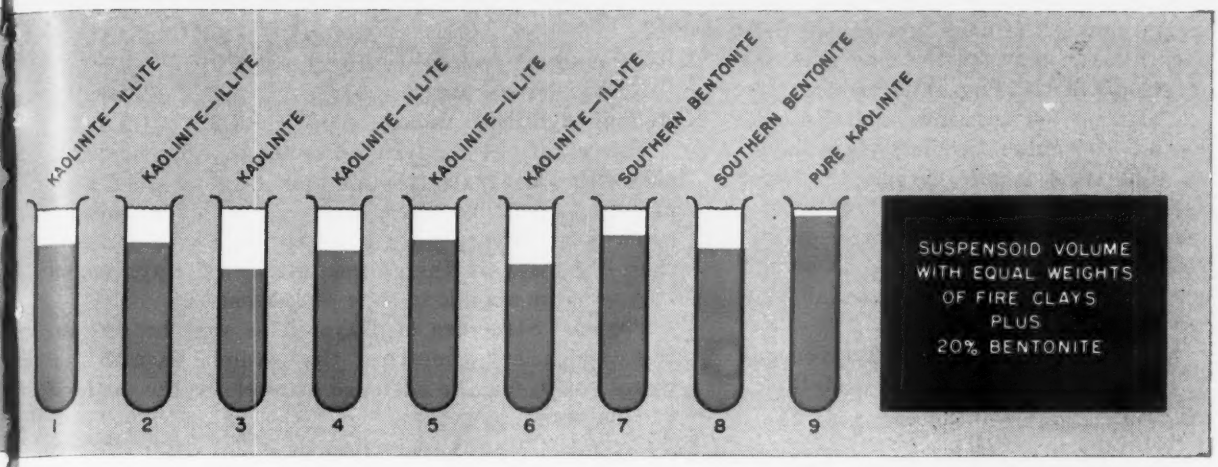


Fig. 2—Variation in settling power of the clays after addition of 20 per cent bentonite after standing for two weeks

ic Molding Sand

By W. W. KERLIN
Meehanite Metal Corp.
New Rochelle, N. Y.

II. Fusion Point—This is a property which means much more to the ceramic chemist than to the foundryman. In the first place, sand burn-on is a function of so many things other than fusion point of the clay that this simple property is secondary. The softening point of the clay or clay-sand mixture may be a factor, however. In the second place, the fusion point does not tell at what point the clay looses its combined water, and this is where it breaks down and loses its ability to be revivified when a sandheap is retempered.

The hot strength and toughness is determined by the dilatometer and similar instruments have been found to give more useful information on sand-clay mixtures than fusion point data.

III. Plasticity—The general factors underlying the tensile strength of a moist clay, and thus its bonding power, get somewhat closer to what happens to a clay-sand mixture when tempered. Owing to its high absorption capacity, the clay particle or flake has a strong attraction for water. It surrounds itself with a firmly attracted water film. If the water is not sufficient for complete saturation of the absorptive forces, adjacent clay particles with their water envelopes are strongly attracted and result in a firmly coherent mass of clay. This is the case in a tempered molding sand where the moisture added is just under that required to saturate the clay. The sand and clay envelopes then attract one another and cause the sand to have green strength.

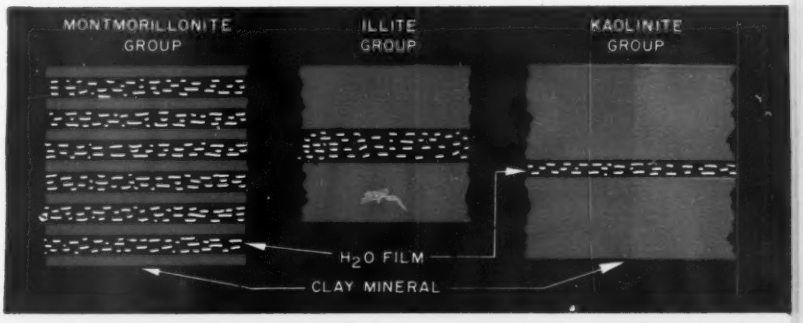
A useful test which will evaluate the bonding power of a clay is also quite simple and can be carried out in most sand laboratories. Various samples of clay are exposed to an atmosphere of 100 per cent humidity for two weeks or a month. They are then transferred to a sealed container so that the absorbed water may attain equilibrium. The amount of water absorbed by each sample is then determined by heating them for 1½-2 hours at 220°F and measuring the loss in weight. Several typical results are given here.

	Water Absorbed Per 100 g Clay	Max. Strength with Dry Strength	Std. Silica Sand Green Strength
Western bentonite	12.9	100 lb (3% bent.)	13.8 lb
Plastic bonding clay	5.5	40 lb (5% clay)	5.7 lb
Clay from natural molding sand	6.3	40 lb (5% clay)	5.0 lb
Plastic surface clay	3.6	10 lb (5% clay)	6.1 lb
Plastic fire clay	4.0	8 lb (5% clay)	5.2 lb
China clay	1.9	5 lb (5% clay)	3.6 lb

From these tests it would appear that there is fair correlation between moisture absorption of a clay and its dry bond strength. At any rate, if the moisture absorbed is less than 6 per cent, it is quite likely that its contribution to the dry strength of a molding sand mixture would be less than satisfactory.

Clay Material in Foundry Sand—By the time a clay gets incorporated in a foundry facing, it is diffi-

Fig. 3—Water absorption in relation to type of clay



cult to decide what is clay and what is something else. Numerous investigations in the past have shown that having the proper balance between the clay material and the sand grains in a molding sand reduces the danger of such defects as fissures, rattails and buckles. The variety of these bonding clays is so great, however, that it is unsafe to use the term "clay material" as the subject of a general recommendation on sand mixtures. As an example of this problem, consider the variation in the results of two standard methods of determining clay material from eight typical new molding sands:

	AFS Method	Bouyoucous Method
Jersey gravel	24.6%	20.8%
Heavy Jersey molding	19.6	7.3
Heavy Ohio molding	19.2	17.2
Medium Ohio molding	26.2	7.8
Ohio molding, medium bond	17.9	11.8
Medium Tennessee red	18.0	7.2
Light Albany	16.7	8.4
Light Indiana	17.5	8.6

It is generally recognized that the first method does not obtain the true clay content, whereas the Bouyoucous test more nearly represents the true clay content of certain sands, i.e., the particles of less than .0002-in. diameter.

The Bouyoucous test was developed for testing soils, and it is stated by the manufacturers of special hydrometers used for this purpose that when Bentonite is present in the mixture, certain slimes are formed which introduce errors in this determination. Since many foundry sands contain this ingredient, the general use of the hydrometer method for clay determination of foundry facings and heaps has not developed.

A modification of the Bouyoucous test can largely overcome this difficulty, by dispersing the clay in a sand sample with an aqueous solution made up to an alkalinity of pH 9.0-10.0 with ammonia. The concentration of silt plus clay, when the solution is made up to the required volume used in the Bouyoucous test, should not be more than 10 g per liter. The silt and clay particles can then disentangle themselves, and a reliable determination of silt and clay particles can be made by a special sensitive hydrometer (Taylor Instrument Co. No. 22293).

Below are given comparative results on several successful foundry sands tested in this way:

	AFS Method	Hydrometer Method	
		Silt	Clay
Light green facing	10.4%	5.2%	2.6%
Heavy dry facing	17.0	6.2	5.6
Medium synthetic facing	8.0	4.2	2.8

This ability of western bentonite to form suspensoids with other materials in a molding sand has a very profound effect on the characteristics of a foundry sand. It is the purpose of this paper, therefore, to further elaborate on the characteristics of clays which may serve as a guide to their proper use.

Physical Structure of Clays—This very broad subject, which has concerned the ceramic chemist for many years, may be sketched in brief for the purpose of this paper.

Consider first the reaction of water with clay. It is well known that when clay is shaken up with an excess of water, it will settle out to form a jelly-like liquid at the bottom of the jar, with a supernatant

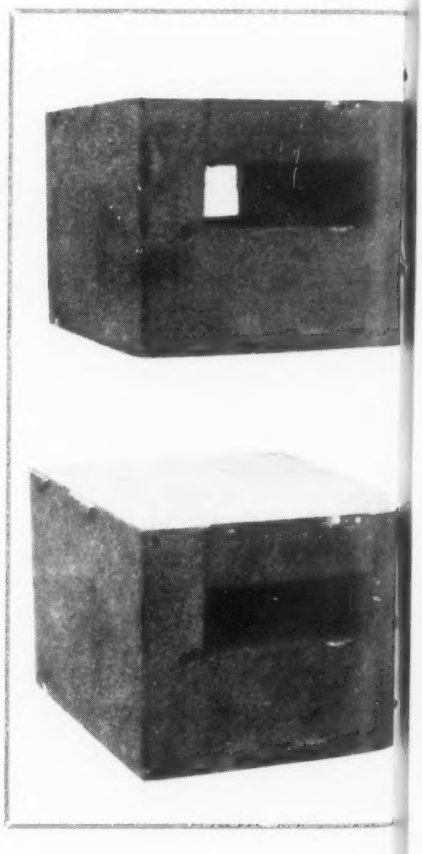
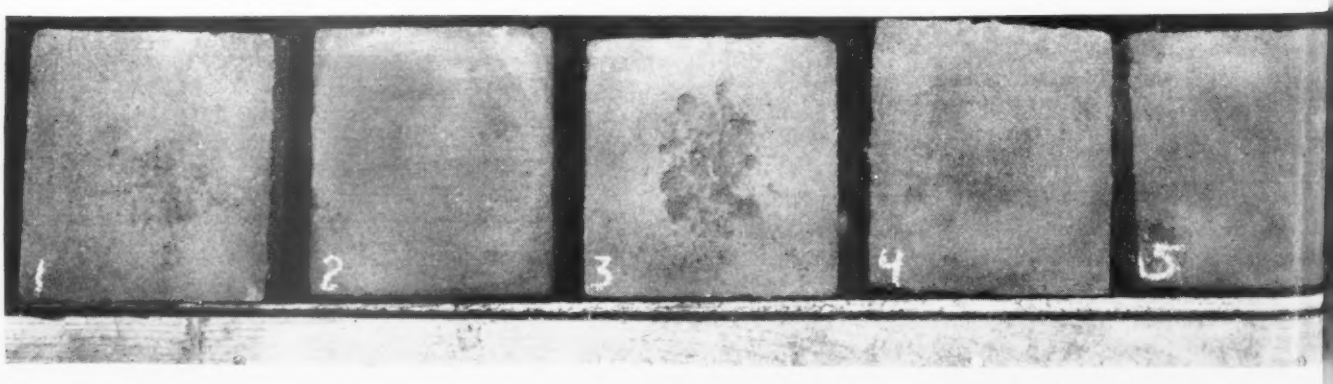
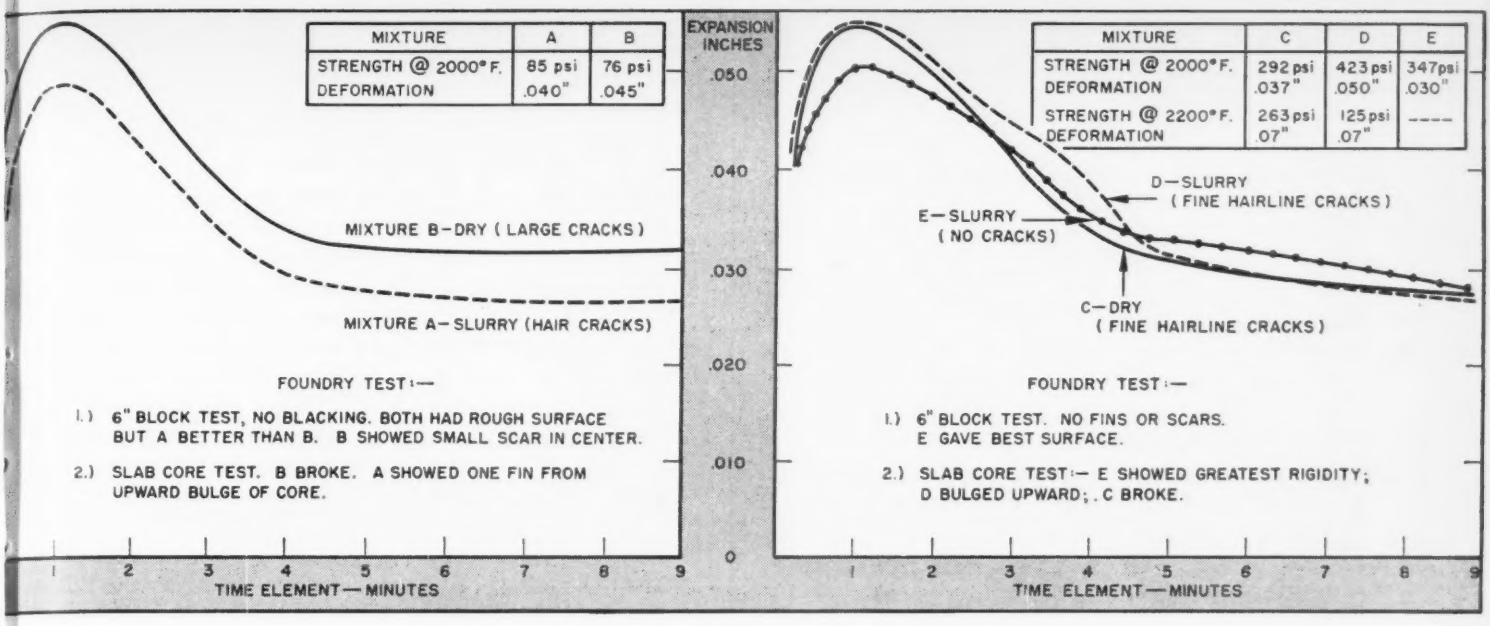


Fig. 4 (right) — Slab core test

Fig. 5 (below) — Effect of pouring 6-in.-square blocks on slab cores 1 in. thick




MIXTURE | A | B
STRENGTH @ 2000°F. | 85 psi | 76 psi
DEFORMATION | .040" | .045"
MIXTURE B—DRY (LARGE CRACKS)
MIXTURE A—SLURRY (HAIR CRACKS)
FOUNDRY TEST:—
1.) 6" BLOCK TEST, NO BLACKING. BOTH HAD ROUGH SURFACE BUT A BETTER THAN B. B SHOWED SMALL SCAR IN CENTER.
2.) SLAB CORE TEST. B BROKE. A SHOWED ONE FIN FROM UPWARD BULGE OF CORE.
TIME ELEMENT—MINUTES
EXPANSION INCHES
.050
.040
.030
.020
.010
0
MIXTURE | C | D | E
STRENGTH @ 2000°F. | 292 psi | 423 psi | 347psi
DEFORMATION | .037" | .050" | .030"
STRENGTH @ 2200°F. | 263 psi | 125 psi | ----
DEFORMATION | .07" | .07" |
D—SLURRY (FINE HAIRLINE CRACKS)
E—SLURRY (NO CRACKS)
C—DRY (FINE HAIRLINE CRACKS)
FOUNDRY TEST:—
1.) 6" BLOCK TEST. NO FINS OR SCARS. E GAVE BEST SURFACE.
2.) SLAB CORE TEST:— E SHOWED GREATEST RIGIDITY; D BULGED UPWARD; C BROKE.
TIME ELEMENT—MINUTES

Figs. 6-7—Dilatometer and foundry tests on various sand mixtures

solution of clear water above. It is known variously as a suspensoid or thixotropic gel. The latter term is usually given where the gel is largely made up of clay material. The amount of water these gels will hold is governed by the physical structure of the clay. The pH value of the water has some effect so any comparative tests should be made with distilled water.

Fig. I shows the volume of equal weights of several clays which have settled for two weeks. Clay No. 9 w. · a china clay which was almost pure kaolinite. No. 3 was a commercial bonding clay high in kaolinite while numbers 1, 2, 4, 5, and 6, were rebonding clays belonging variously to the kaolinite-illite group. Nos. 7 and 8 were southern bentonites. The exhibit does not include western bentonite, but if it had, there would have been no separation evident.

Mixtures of western bentonite with the above clays profoundly increase their ability to retain water. Fig. 2 illustrates the same clays containing 20 per cent of western bentonite (total weight of dry solids being the same). These simple experiments demonstrate that differences in structure affect this property to retain water in the jelly-like suspension. It can be shown that it makes considerable difference in a molding sand if all the water in the bond is held in the form of the thixotropic gel or just part of it (U. S. patent No. 2,514,133).

The difference in the structure of clays is illustrated by comparing three general types of structure—montmorillonite type, illite type and kaolinite type. (See W. Davies, *Journal*, Iron & Steel Institute, vol. 154, part 2, 1946.)

The molecular structure of a clay resembles a tiny flake or plate. When water is added, these plates move away from each other and water takes its place between the plates. The clay thus swells similar to the way the folds of an accordian expand. The comparative size and ability of the various particles to absorb water are illustrated in Fig. 3.

The physical difference in the three groups is illustrated by: (a) The fineness with which the individual plates are split up, and (b) The thickness of the water film absorbed between the plates.

The increased viscosity caused by this combination is responsible in large measure for the green strength contributed by clay. It has been found that this is not the only property that is influenced by variations in this structure.

Montmorillonite Group—It follows, therefore, that a clay in this group will break up into a large number of extremely minute flakes. The great number of water films between flakes indicates that the order of plasticity will be high. The huge surface area for the development of water films also indicates that water of plasticity and drying shrinkage will be relatively high. Bonding power in green sand mixtures will also be high.

Reference to Fig. 1 indicates that the southern bentonites retain the most water in the thixotropic gel. The amount retained under the conditions of this experiment was 26-30 per cent as compared with 13-14½ per cent for the kaolinite type clays. The significance of this difference will be discussed later.

The western bentonites also belong to this group, but a difference in the molecular structure enables the clay particles to subdivide to almost an indefinite degree. A solution of as much as 98 per cent water will not separate out into two distinct phases as illustrated in Figs. 1 and 2. This ability to disperse indefinitely has its limitations in this special case because the viscosity of these dilute solutions is not great enough to be of much value where foundry sands are concerned. In other words, overtempering a purely bentonite bonded sand is quite easy because the gel becomes watery with too great dilution.

Kaolinite—Illite Group—From the sketches, it can be seen that these types of clay have less tendency to break up into minute flakes when mixed with water. Moreover, the thickness of the water interface between these particles is thinner, so its plasticity is less. Conversely, their shrinkage under heat attack

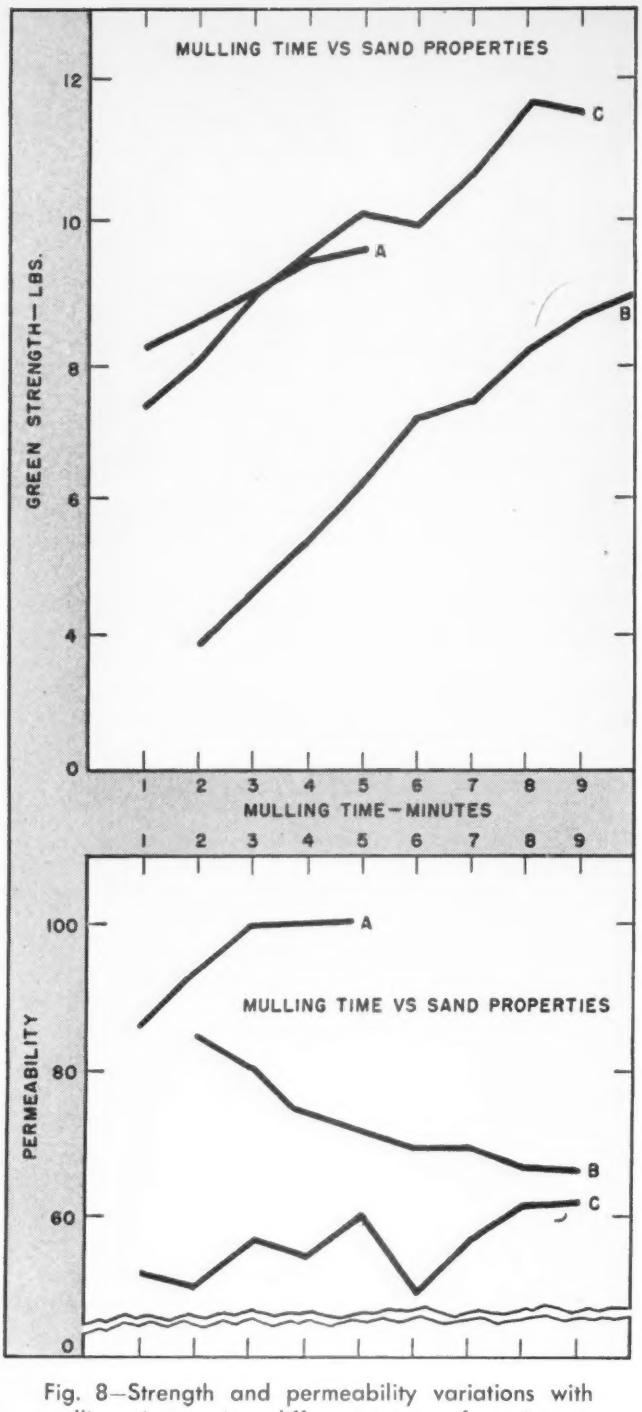
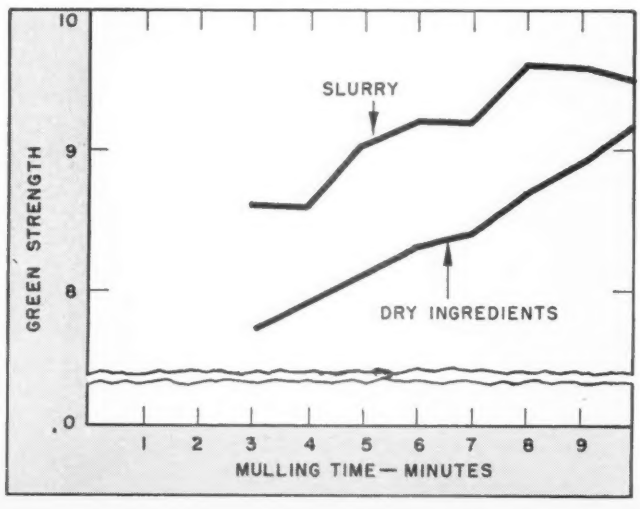


Fig. 8—Strength and permeability variations with mulling time, using different types of equipment

Fig. 9—Green strength as function of mulling time



would be less because of the thinner water film at the clay-water interface.

China clay is the purest form of the kaolinite group. Its refractoriness and hot strength are high, but used by itself it is not very effective as a producer of green strength in foundry sands. Clay No. 3 (Fig. 1) is typical of a commercial foundry clay of the kaolinite type. Fireclays of the better type contain large percentages of kaolinite but they are not always ground fine enough to be efficient for molding sand use. These clays can be made more efficient by fine grinding but there is a limit to this improvement because structurally they are different from the bentonite group.

The clays of the illite group tend to be intermediate between the kaolinite and montmorillonite types in their ability to split up into fine flakes. The green bonding properties are intermediate, provided the clay has been properly prepared by fine grinding. Most bonding clays are combinations of the illite and kaolinite groups, so all of their properties vary according to the nature of the deposit they come from.

Bentonite—Clay Combination—The tremendous increase in ability of bentonite-clay combinations to absorb water in the thixotropic gels (Figs. 1 and 2) has a profound effect on the properties of the mold under the influence of molten metal. Laboratory and foundry tests were made on the following sand mixtures:

	1	3	4
Silica sand (Av. fineness 64)	200 lb	200 lb	200 lb
Silica flour	5.5	0	0
Western bentonite	1.4	0	1.7
Kaolinite type bonding clay	0	22	15.8
Corn flour	.9	.9	.9
Dextrine	2.6	2.6	2.6

These mixtures were made up so that each had as nearly as possible the same properties and temper characteristics. Bentonite and clay was added in the form of slurry to the dried sand. The tests on these three sands were as follows:

	1	3	4
Permeability	88	62	85
Gr. compression, lb	1.8	1.0	1.6
Moisture, %	5.2	5.2	4.5
Strength at 2000°F, lb	77	138	145
Strength at 2200°F, lb	48	56	58

These sands were used as a facing for 6 x 6 x 6-in. test blocks, dried and cast from metal at 2600°F to see how they would stand up under heat attack. In Fig. 5 is the photographic evidence from the bottom of these castings. Castings Nos. 1, 3 and 4 refer to the mixtures of the same number—the molds in the unblackened condition.

It will be noted that there were just a few scars from the mixture made up with the silica flour slurry and none from the mold that had been blackened (No. 2). The mix using the bonding clay slurry alone had very bad scars from metal wash whereas the one with the bentonite-clay slurry had just a little roughness and none at all on the blackened mold (No. 5).

These results are typical of a number of experiences encountered with clay-bentonite mixtures, and

it appears as though an important factor is the way in which the clay is held in combination by the water. Take the three mixtures cited above. If all of the moisture could be considered associated with the clay and cereal binder the proportions would look something like this:

H_2O based on total sand	5.2%	5.2%	4.5%
H_2O based on total binder content	53%*	33%*	33%
Capacity of bond to hold H_2O	85%*	15%*	70%

* Silica flour included because it made a stable gel with bentonite.

The items on the last line were obtained from determining the water contents of the gels illustrated in Fig. 2. It can be seen that the capacity of the bonds to hold water in mixtures No. 1 and No. 4 are both greater than the actual moisture content of the

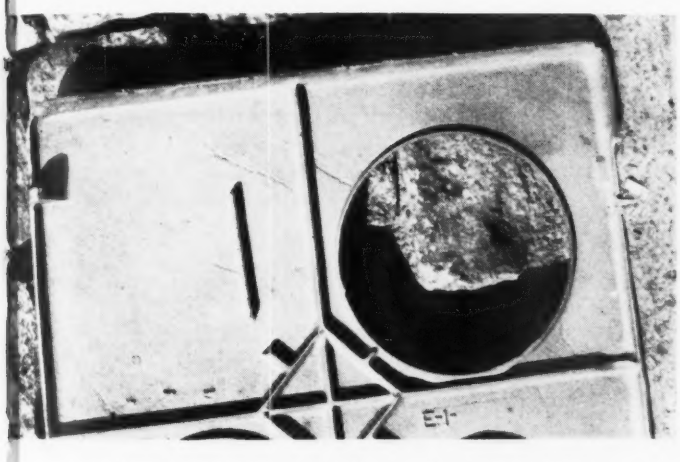


Fig. 10—Test castings for surface imperfections

sand. It would be safe to assume that the moisture in these two mixtures is in more close association with the clay bond than is the case with No. 3, where the capacity of the clay to hold moisture in a thixotropic gel is less than the total moisture content of the sand. It has been found in a large number of cases that the proper combination of clays has solved numerous foundry difficulties.

A typical case can be cited where use of this combination cured a bad case of buckles. The castings made were of medium weight, 50 to 250 lb, with many flat surfaces. It was all green sand work. The facings used were made up as follows:

	Old	New
Heap sand	210 qt	210 qt
Michigan lake sand	40	40
Dextrine type binder	2	2
Coal dust	12	12
Western bentonite	1-2	2
Illite type bonding clay	0	3
Properties:		
Permeability	76	60
Gr. Strength	7.3 lb	7.3 lb
Moisture	4.6%	5.4%

The only difference was the introduction of the bonding clay. There was an immediate improvement but the danger was still present because the backing sand was still so weak. The green strength was only 3.2 lb because the old facing did not have enough revivifying power to keep up the strength of the heap. This could have been rectified by adding a good grade of natural bonded molding sand, but in this case, the strength was brought up by mulling some of the bonding clay into the heaps bringing up the strength to 5 to 6 lb. As this heap sand returned to the facing, some modification in the bentonite content of the facing mixture was necessary to keep green strength and flowability within desired limits, but after a few days every buckle on the floor disappeared.

In general, the clay content of a heap sand should show 2-3 per cent by the hydrometer test if it is to serve as a base for a medium to heavy foundry facing. This presumes that the clay bond is properly distributed by good mulling, which is more of a problem than many foundries realize.

Use of Thixotropic Slurries—The numerous laboratory testing devices still do not tell all that needs to be known about a facing sand. For example, there was nothing in the laboratory tests in mixtures 1, 3 and 4 that would foretell that one mixture would fail in the foundry test. There are two foundry tests, however, that Meehanite foundries have found to be quite useful in supplementing laboratory procedures, especially in research work.

The first one is the 6 x 6 x 6-in. solid block shown in Fig. 5. This is gated at the joint allowing the metal to drop six inches to the bottom. Another test piece called the "slab core test" is a block shown in Fig. 4 in which the sand to be tested is made into a slab core, unreinforced, baked and set into the mold so that it has a 6 to 8-in. span between core prints. In the tests to be described, the span was 8 in. and the core thickness 1 in.

The first mixtures were made up of the following: Michigan lake sand 32 lb (40-70 mesh), bank sand 4 lb (100-200 mesh), dextrine ¼ lb, silica flour 1 lb, western bentonite ¼ lb, corn flour 1/16 lb.

Mixture A was made by adding the silica flour, corn flour and bentonite in the form of a slurry containing 34 per cent solids. It was mulled six minutes in a laboratory muller. Mixture B was made by adding all ingredients dry and mulling six minutes after tempering.

The tests for strength and permeability were about the same at: Moisture 6.0 per cent, permeability 180, green strength 1.0 lb., tensile strength 80 psi.

The results on the dilatometer and the foundry tests are shown in Fig. 6. About the only laboratory test that indicated A was better than B was the size of the cracks in the expansion test piece. The difference in their action in a mold was somewhat startling, however.

The reason silica flour was used in this test was because it approximated the size of the fines and silty substance that occurs in a fine molding sand. If such a sand is mixed so that the silty substance is associated in the jelly-like mass around the grains, it gives one result. If it occurs as (*Please turn to* **page** 223)

Gating for Shell

By WALTER A. SOKOLOSKY
Foundry Engineer
Monsanto Chemical Co.
Plastics Division
Springfield, Mass.

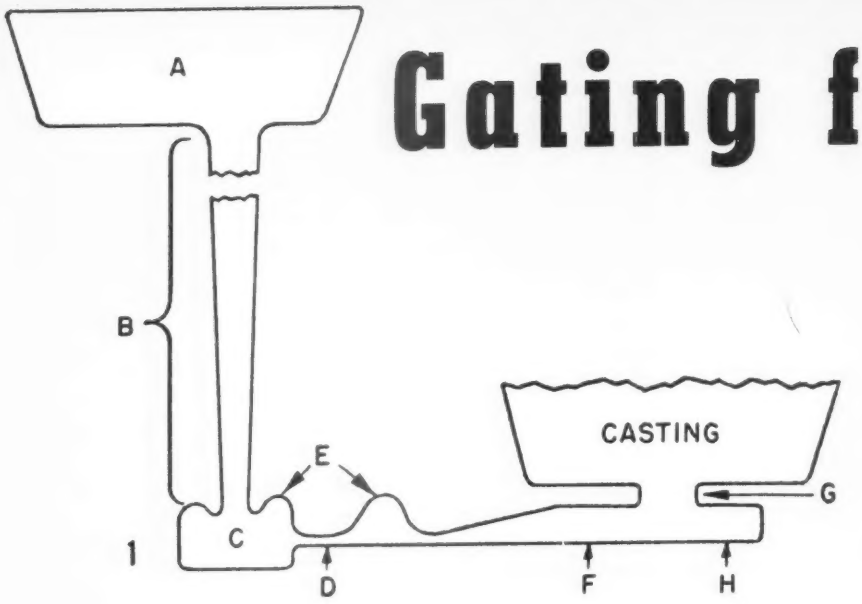


Fig. 1—Gating method used successfully in shell molding. See text for explanation of lettered members

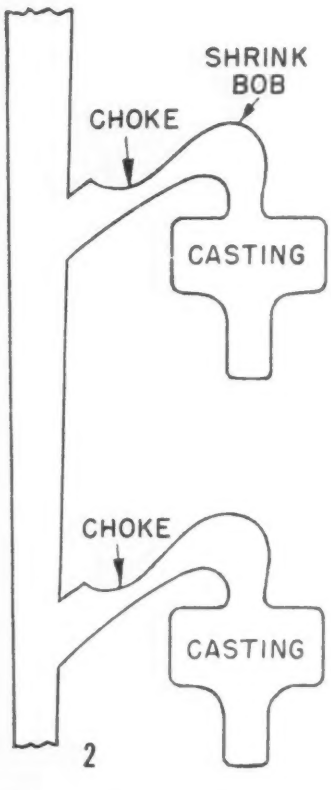


Fig. 2—Top gating and risering method used on chunky castings

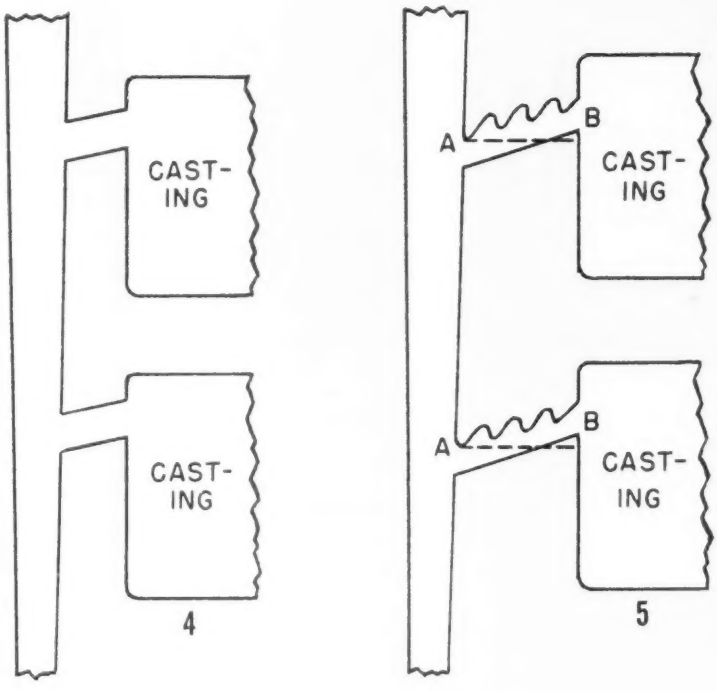


Fig. 4—Shell mold casting gated as shown here had dirt and slag inclusions. This was overcome by the substitution of a saw-tooth type of gate with greater slope to the ingate, as shown in Fig. 5

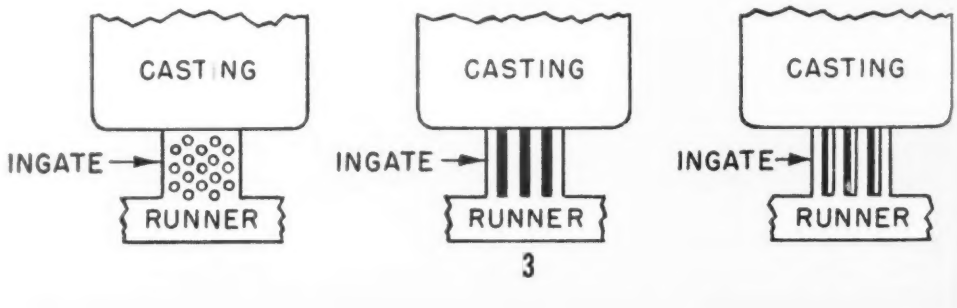


Fig. 3—Types of strainer cores

Molding

IN the new field of shell molding, full advantage should be taken of the many favorable aspects of the process. One such aspect is the gating of castings to be made in shell molds.

At the risk of oversimplifying the subject, some of the fundamentals of gating are presented here. These fundamentals have been proved in practice.

One of the basic differences between green sand molds and shell molds is the resistance to metal flow offered by the mold surfaces. In shell molds, this resistance is substantially less than in the case of green sand molds. Consequently, it is obvious that, in most cases, gating systems in shell molds that are patterned after gating systems for green sand molds will permit insufficient retardance of slag and dirt inclusions during the passage of the metal through the gating systems. It follows, then, that dirt and slag inclusions are most apt to show up in shell molded castings even though a similar gating system in a green sand mold would produce a clean casting.

A fundamental method of compensating for the reduced resistance to metal flow offered by the shell mold surfaces is to reduce the size of the gating system and, as an insurance measure, improve the choking medium. It is not necessary to indicate the economy in reducing size of gating systems.

One of the better methods used in gating a casting to be made in a shell mold is illustrated in Fig. 1.

Pouring basin "A" illustrates one type of basin which has found successful use. Provided the design of the basin assists in holding back the dirt arriving with the first surge of metal into the basin, then pouring basins are not too critical members of the gating systems.

Performing a highly critical function is downsprue "B." Note that approximately a 3-to-1 taper is pictured. Within reasonable limits a 3-to-1 taper is effective in providing a quick choke in addition to helping reduce turbulence to a minimum. This taper will also reduce gas absorption into the metal as compared to a straight or reverse taper sprue.

Round, square or rectangular downsprues are used in various shell molding installations, with personal preferences or design facility usually the criterion.

"C" denotes a well at the bottom of the downsprue which acts as a turbulence dissipator and dirt trap.

The primary or basic choke used in the gating system is at "D." This is again a most critical and important function, particularly when iron is the metal poured. Occasionally, a double choke is used.

Pressure equalizers and dirt catchers are at "E."

"F" indicates the runner and "H" the flow-by of the runner. In this gating system, the runner is made a little larger in size than might be considered adequate. This is done to get better pressure equalization in order to permit slower and less turbulent flow of the metal through the ingate and into the mold.

Ingate "G" is pictured somewhat larger than might be expected. It has been found quite expedient and correct to use a large flat ingate into shell molded castings. If a small ingate is used with the supposedly beneficial effect of a choking action, the fan and nozzle effect of the small ingate causes turbulence and mold erosion. With sufficient choking effect in preceding parts of the gating system, it is not necessary to use extensive choking in the ingate. Of course, factors such as despruing must be considered.

The above gating system is most applicable to larger castings that must be perfectly clean.

It should be pointed out that shrinkage in shell molds is not as pronounced as it is in green sand molds. However, the difference is small, and methods of feeding shell-mold castings must be incorporated.

On some small, chunky castings a top gating and risering method, as illustrated in Fig. 2, has been utilized. Of course, variations of this method can be used. The fundamentals, as pictured, will in many cases eliminate shrinkage problems.

Another effective method of gating being used successfully at present employs most of the fundamentals described previously but adds a variation to the ingate. Essentially, this variation includes molding-in a strainer core effect directly in the ingate. The strainer core effect can take the form of slots, round or pins (Fig. 3).

Of course, when small castings are being made and there are multiple pattern impressions on one plate, simplified gating systems are effective due to the reduced metal flow into any one individual pattern impression or mold cavity. A strap gate off a downsprue or runner will usually be adequate. However, it must be borne in mind that, regardless of the type of casting poured, the gating systems used in shell molding must be smaller than gating systems used in green sand molds for the same type of casting.

Occasionally, a problem child occurs in a casting which shows dirt when shell molded, but is difficult or costly to rig up in any manner but with a strap gate off a down sprue. For example, a casting gated as in Fig. 4 shows dirt and slag inclusions.

It has been found practical to replace the noted gating system with a saw-tooth type of gate with a greater slope and get a clean casting. This corrective procedure could be pictured as in Fig. 5. One of the critical points in this gating method is to have the top of the ingate at the downsprue "A" located at a little lower level than the bottom of the ingate at the mold cavity "B" for maximum effectiveness.

There are just as many satisfactory gating systems for a number of shell molded castings as there are satisfactory gating systems for a number of green sand molded castings. In other words, the flexibility is there in gating for shell molding. However, shell molding is a precision casting method with easily controlled variables. It, therefore, lends itself to a more specific and scientific method of gating. The basic consideration of reduced friction between metal and mold face, however, is a major factor in planning a shell mold gating system.

The Engineer and the Foundry

Usefulness of the growing number of engineering graduates entering the foundry industry can be increased if their qualifications are understood, the author maintains. The sort of an individual that comprises today's engineering graduate is described in this paper originally presented before the Western New York Chapter of the American Foundrymen's Society

By DOUGLAS C. WILLIAMS
Associate Professor and Head of Foundry Area
Department of Industrial Engineering
Ohio State University, Columbus, O.

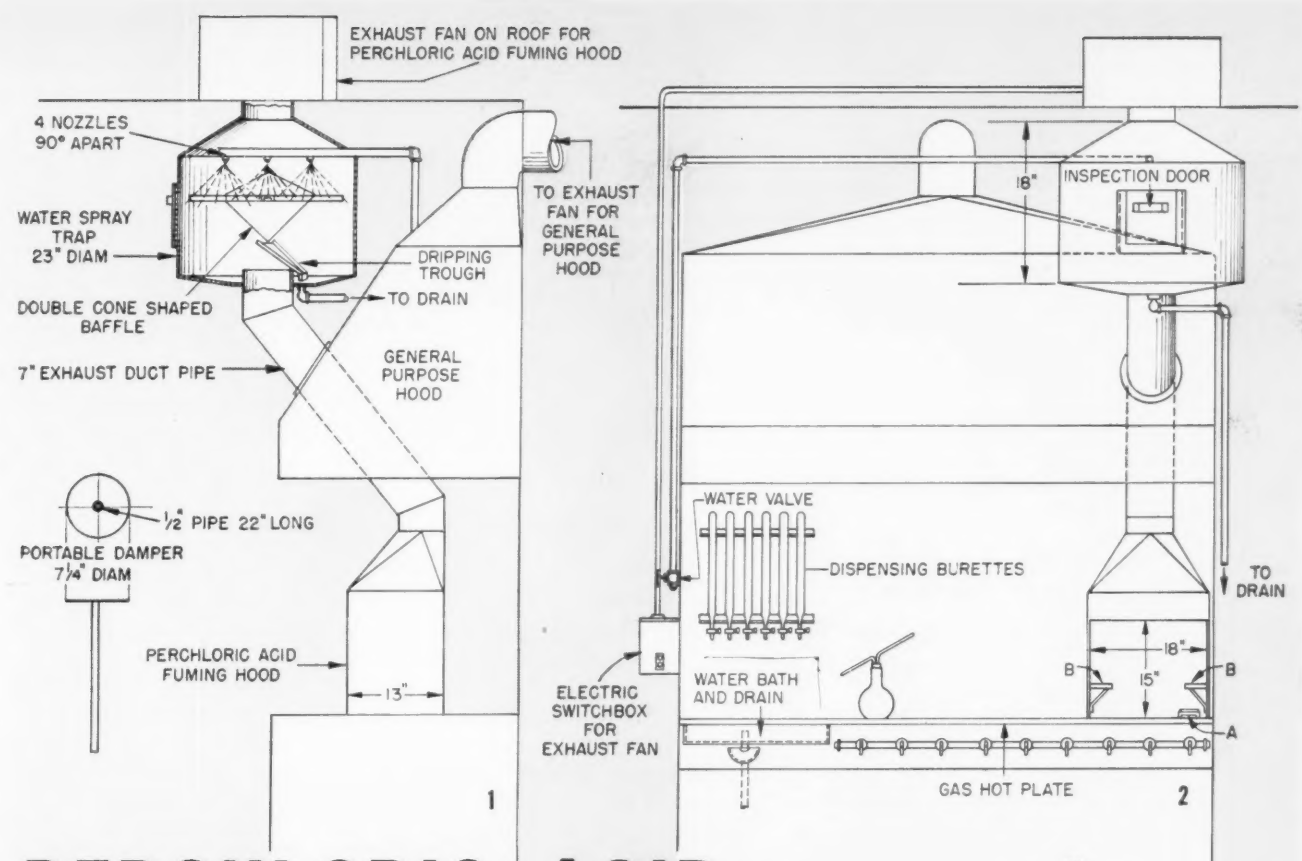
FOUR or five years ago our current graduate entered college to pursue an engineering training. Why did he select such a field for his life work? Somehow he acquired the idea that if he graduated from college he could then command a higher income than someone who did not go to college. Do not most high school commencement speakers shout that kind of philosophy? Seldom do we hear about more education to fit us for better service to the world. So from high school, he carries through his college years a dream that when he comes to you he will make lots of money.

According to J. M. Juran,[1] "More than half of the young engineers aspire to end up as executives and managers." Many of you expect them to eventually progress through the ranks of supervision into managerial positions. Juran also claims "that the engineer, aside from his knowledge of mechanics, is trained in a methodology sorely needed by management." In engineering curricula today you will find that students are introduced to socio-humanistic courses for the purpose of having them learn about people and their ideas. Dr. Monin,[2] back in 1924, stated "skill and knowledge conquer machines; insight and wisdom conquer people." Just as the three R's are skill and knowledge devices at the grammar school level, the engineering courses at college provide higher skill and knowledge levels. A manager, operating through other peoples' endeavors, must have insight and wisdom to provide leadership. In universities, we can only introduce the engineering student to the study of people. Industry must supply the major laboratory training for its future executives and managers.

The graduate engineer which you obtain has needs which only you can can supply. Rowena Ferguson[3] aptly expresses those needs as follows: "In addition to the obvious physical needs of food and clothing, human beings have emotional needs that are just as real but not always recognizable. One important emotional need, shared by persons of any age, is for approval, and closely akin to that is the need to be liked, accepted and be looked up to. When a person feels, either consciously or unconsciously, that he is accepted he will feel emotionally secure. Such security is essential to a healthy personality." If your management does not foster emotional security among its supervisory staff, how can such a staff in turn create such emotional security for the engineering trainee.

We must remember that in college the student was accepted and looked up to as a vital link in his community. If you, for whatever reason, withhold acceptance you may wonder why he moves on to another company. Dollars and cents are important but, remember, he has emotions. Acceptance must include the location in the community where the graduate lives. It will improve the sense of being wanted if the employer is interested in where he lives and how well he becomes integrated with his community.

The engineer who comes to you has been trained to see facts and to think through problems and evaluate as to right and wrong. The engineer is deeply interested in the morals and ethics of the company he may work for. If your practice is to support the black or gray market in order to obtain materials, you had better so inform the prospective engineer because he will find out sooner or later. When he does he is apt to seize the first opportunity to seek another position. From a moral point of view some people are dissatisfied if they must work where war material is produced. You should be honest with the engineer as to what you will and will not manufacture. The engineer knows a company must (*Please turn to page* 259)



PERCHLORIC ACID— *It Can Be Used Safely*

Figs. 1-2—Fuming hood designed to eliminate hazards connected with use of perchloric acid

THE question of risk when using perchloric acid in iron and steel laboratories continues to arise. As with all explosives, a complete respect for the potential destructive power of perchloric acid and its condensed salts on the inner surfaces of hoods or ventilating systems is the first thing to keep in mind.

As a result of several hood explosions in recent years caused by the use of perchloric acid, industrial insurance companies have become more demanding with regard to safety precautions to be taken in handling and using perchloric acid in industrial laboratories. Following is an outline of our laboratory practice which we have been using successfully for several years. This technique and the hood construction employed have been approved by our factory insurance company.

By W. B. SOBERS
Chief Chemist
Chain Belt Co.
Milwaukee

Hood Construction—The fume hood and duct should be free of wood and organic material. Any inorganic material, provided it is not porous or absorbing, should be satisfactory.

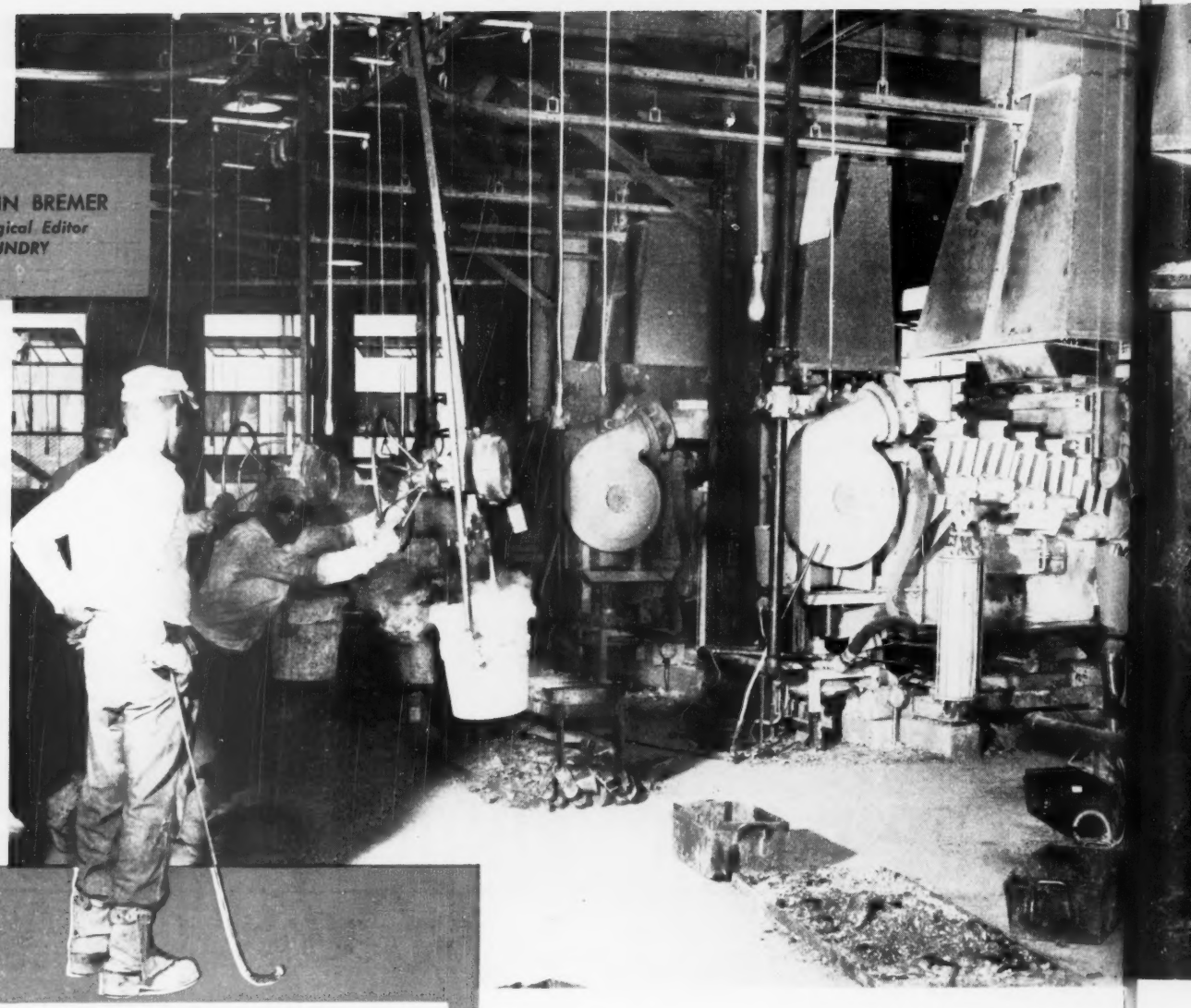
The hood should be free of any baffles. Duct work should be in a vertical position and the motor housed on the roof. With this type of construction, no other precautions are necessary; however, a mist water spray unit may be installed in the duct outlet to condense some of the hot perchloric acid fumes (Fig. 1).

Periodically one should check the duct outlet for any deposits of chemical salt residues. Clean inside of the hood each morning of any condensed chemical salt deposits before starting the hot plate. Gas or electric hot plate may be used.

If a laboratory has a large hood which is of questionable safety for handling perchloric acid work, one other precaution may be taken, i. e., install a small hood within the large hood (stainless steel construction, Fig. 2). The small hood, having its own exhaust motor housed on the roof, is used only with perchloric acid work. In addition, a mist water spray may be part of the duct outlet to condense some of the perchloric acid fumes (Figs. 1 and 2). It will be noted that our duct work runs on an angle. Due to our building construction we were unable to run straight up with the duct work. General analytical work is carried out under the large hood.

Having the perchloric acid hood installed within the large hood makes it pos- (*Please turn to page* 216)

By EDWIN BREMER
Metallurgical Editor
FOUNDRY



Ladles of molten metal being conveyed on an overhead system from the furnaces to the pouring areas

DEPARTMENTAL TEAMWORK

Improves Casting Production

SIMPLIFICATION and the standardization of operations have been outstanding factors in the development of high productivity in American industry. In the foundry industry such progress began to be evident on a large scale first in the automotive field. In this and other industries distinguished by huge production lots of relatively few parts, intensive study could be given to simplification and standardization. Extensive mechanization was a "natural," as was also development of relatively rigid molding and metallurgical procedures.

Despite the evident success of such "production-line" foundries, many jobbing foundries have hesitated to attempt all the possible approaches to simplicity and standardization. In some cases, it is said that certain jobbing shops have been oversold on extreme mechanization, without full realization of the inflexibility sometimes involved. In other cases, some foundry managements remained too wedded to the tradition that each pattern is a law unto itself, with requirements as to sands, etc., specially tailored to each alloy and to each range of sizes.

The nonferrous foundry of the Lunkenheimer Co., Cincinnati, is by all reasonable definition a jobbing unit. This well known manufacturer of quality industrial nonferrous and ferrous valves has some 67,000 different patterns for nonferrous alloys. About 40,000 of these come into active use each year. About 80 per cent are for bronze castings, the balance for use with nickel alloys.

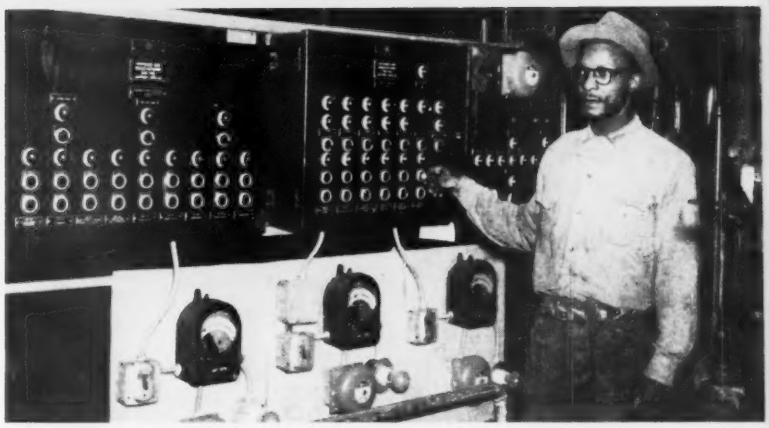
The yearly castings production is around 22,000,000 lb, comprising nearly 10,000,000 bronze and over 1,000,000 nickel-base alloy castings. While the majority of the castings are small, averaging around 2 lb, a substantial number of fairly large castings, to about 500 lb, are made.

Operator employing pneumatic tilting equipment to tap bronze melting furnace into the pouring ladle

The tonnage bronzes are ASTM-B61 (Navy M), B62 (85-5-5-5) and a proprietary copper-silicon-zinc alloy. Some other copper-base alloys are made in small volume. Some seven nickel-base alloys (25 per cent to 65 per cent) are cast regularly. The company is recognized as a leader in alloy development. Its modification of the steam bronzes and evaluative studies led to adoption of present B61 composition and ASME code ratings. Extensive studies of copper-silicon and nickel-base alloys have led to various patents and trade recognition. During World War II a substantial amount of aluminum alloy castings was made for various airplane accessories.

The products being valves and engineering specialties, most castings must withstand shell tests (after machining) from 375 psi to 900 psi without leakage. Treatment or impregnation of such parts is forbidden. A few bronze castings must withstand tests to 6000 psi.

There are 16 machine molding stations and one floor for hand molding. Analysis of the time each pattern is in the sand gives an average of 1.35 hr. The shortest run is less than 1 hr, the longest not often over 6 hr. With so many pattern changes, and



Operator controls all sand handling and mixing equipment from a central control board or panel

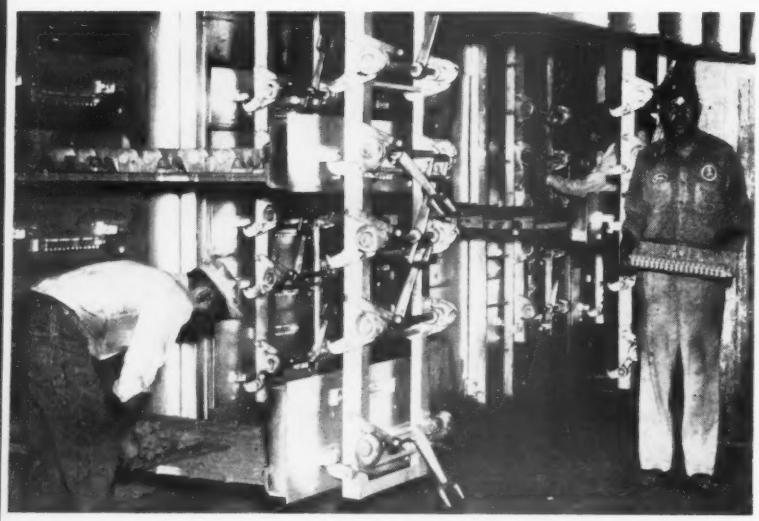
numerous alloys, it is evident that this foundry is in the jobbing shop classification.

Several years ago the management decided to install a rather completely mechanized unit. Before that, considerable flexibility was possible. It was usual to combine floors into groups of two each, to adapt the facings, etc., to their particular requirements, and to an appreciable degree to segregate alloys to specific floors. At one time, as many as eight facing mixtures were used.

It was apparent to the works management, the foundry superintendent, and the research group that many of the advantages of unit mechanization could not be realized readily if special provisions were required for numerous adjustments and variations, and particularly in the sand handling. This group of iconoclasts got the heretical idea, "Why not one sand for all castings, irrespective of their size or the alloy of which they are made? And why use facings anyhow?"

So, prior to the installation of the system, the research men went to work in their laboratory foundry in preliminary trials. From there, with full co-operation and advice of the foundry, pilot lots of the more promising sand mixes were tried on a foundry floor set aside for that purpose. To be sure, all concerned were thought to be crazy and the goal impossible.

However, after about 1½ years' study a wholly synthetic sand mix based on a fine-grained clay-free silica sand was developed, and has been in use since. This



Sand cores on plates arrive on conveyor belts and then are baked in a series of drawer type ovens

sand is used alone *without* any facing, even on the largest castings. Advantages of using only one sand without any facing as practiced at Lunkenheimer are self-evident. Elimination of facing sand and of riddling sand on the pattern markedly reduced molding machine labor. Troubles with washes, scabs, blows, etc., are practically non-existent. Surface finish on castings, both large and small, is excellent. Also, the sand is extremely flexible, and is used on all types of alloys, including monel metal and other high-nickel alloys, silicon bronze, and a variety of copper-base alloys. This sand has been used experimentally on gray iron castings, with excellent finish and freedom from defects.

The foundry industry is interested, and rightly so, in new or novel processes—for example, shell molding, precision casting, die casting, continuous casting, centrifugal casting, etc. Time shows that such processes, although highly useful within specialized limits, are limited from engineering or economic reasons to segments of the wide range of products that must be provided by the foundry industry.

Any new approaches, such as those at Lunkenheimer, in details of the older sand casting processes, therefore, also are of wide-range significance to the industry. Sand casting developments must keep ahead continuously if castings are to compete successfully with other metal products.

Wide use of wholly synthetic silica base sands was pioneered by steel foundries. Yet after many years there is still rather wide usage of facings, special mixes, etc., and indeed, considerable variation in opinions as to what the "ideal" sand should be.

Usage of fully synthetic silica sand base sands has been rather limited in the iron and nonferrous castings fields. Practical usage of the relatively fine grain (about AFS-70) Ottawa sands in iron cores goes back to the work of Bolton at Frank Foundries in 1926. Sands of this type soon began to supplant the coarser silica sands for both iron and nonferrous cores. It was not long until steel foundries began wider usage of these finer sands in their molding sand mixtures.

The first problem, in nonferrous work was to get a sufficiently fine pure silica sand base, and to avoid the temptation to work in natural sands to get finish. Very narrow band sands are not yet available in the finer grades. Five band with 50 per cent on the No. 140 and 200 meshes, at 160 AFS fineness works satisfactorily.

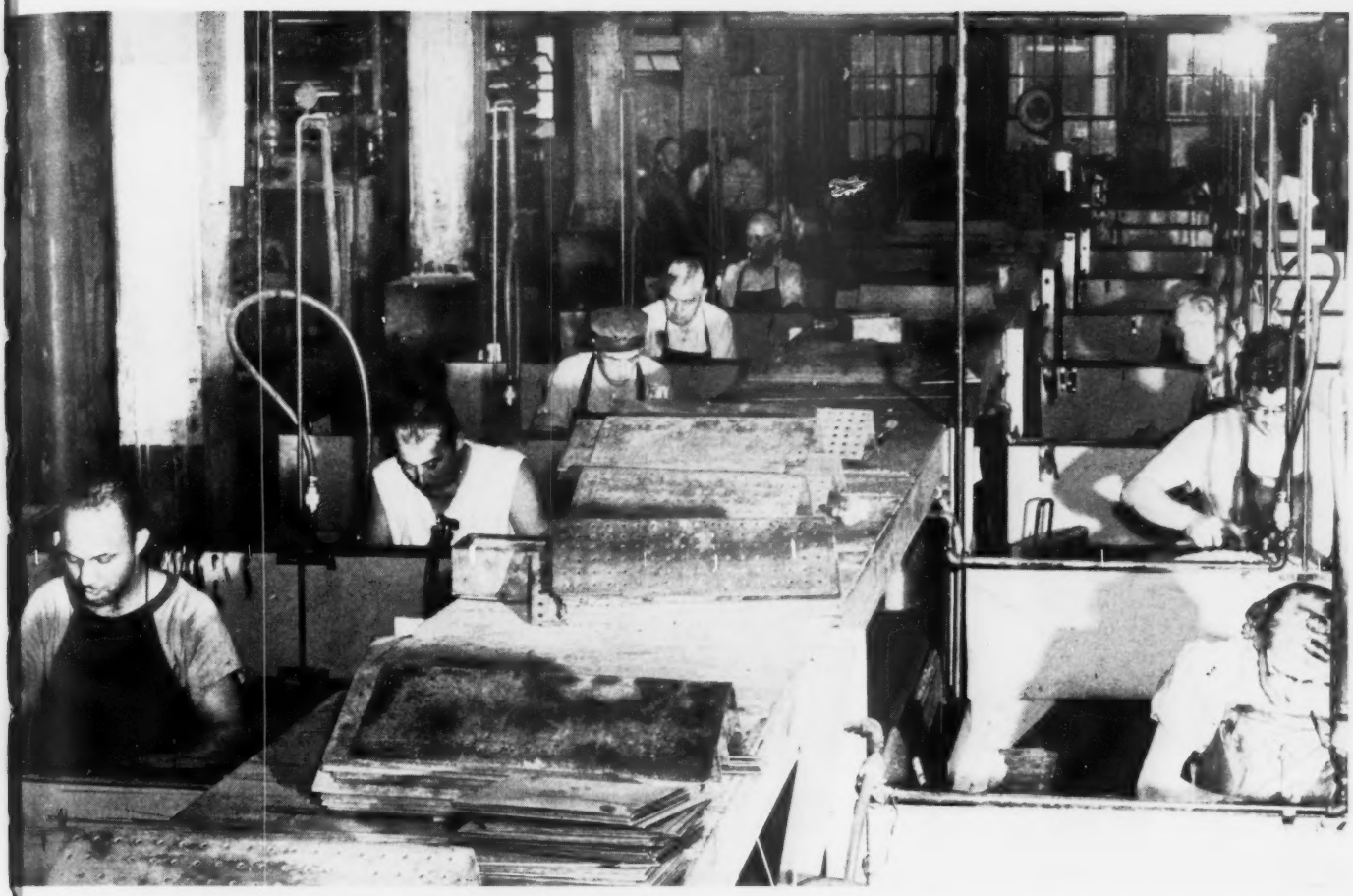
The second problem, that of binders, required considerable study to combine good molding characteristics, easy shakeout, good finish, and long life. Each binder has its disadvantages along with advantages. Bronzes are very susceptible to gassing or pinholes from some types of organic binders. Western bentonite and clay have excessive hot and retained strengths. Southern bentonite is deficient in life, etc. To get wide adaptability in molding characteristics and suitability for a wide range of castings sizes and for alloys poured from around 1800°F to 2600°F requires usage of correct portions of all these binders. Mulling time was established at 4 minutes. Moisture is held closely.

The regular system sand, used as facing and backing (straight drop to mold, no riddling) has the following average properties.

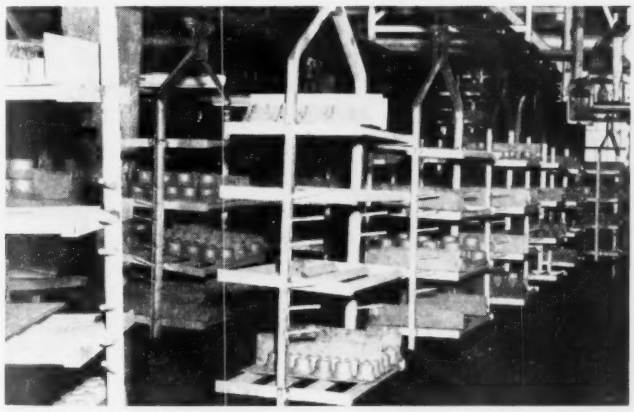
AFS fineness No.	170
Green compression (AFS)	9 psi
Green tensile (local)	18 psi
Permeability (AFS)	29
Deformation	0.020 in.
Hot compression (1100°F)	70 psi
Hot deformation (1100°F)	0.065 in.
Retained compression (after 1100°F)	55 psi
Dry compression	90 psi
Loss on drying (moisture)	3.4

As stated above, this particular sand has great flexibility in application including brasses, bronzes, nickel alloys, and gray iron. (Very limited experiments show that it may have possibilities in medium to small cast steels with binder adjustment, particularly removal of southern bentonite.)

Lunkenheimer therefore has taken the opposite of

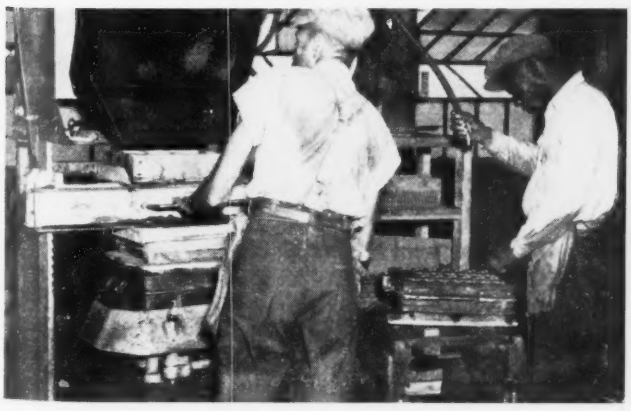


Bench cores made at these stations are placed in trays on conveyor belt for delivery to the ovens

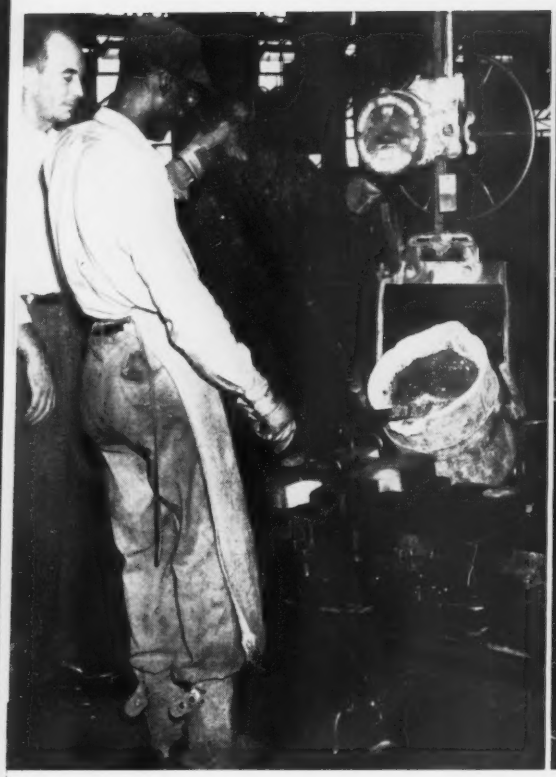


Cores from coreroom are delivered to molding sections by means of a pendant conveyor as shown here

Every ladle of metal is checked for temperature immediately prior to pouring, and the temperature of pouring is controlled within close tolerances



Close-up of one of the machine molding stations. When many small cores are to be set, two men work



Pouring stations are at end of the conveyor lines, and this view shows the pouring of a nickel alloy

Castings are separated from the gate and riser system with high-speed abrasive cut-off wheels

the usual approach to its sand problem. To achieve the maximum benefit of its mechanization, it sought a "universal" sand, and within its practices has been very successful with it. The finishes on bronze castings compare more than favorably with shell mold castings in the same designs. The iron castings samples are "out of this world" in comparison to usual iron finishes.

It may be mentioned that the heat conductivity of this sand is lower than that of high-moisture natural sands. This and other characteristics of the synthetic sand required revisions of pouring temperatures of various castings. Hot sand was a problem for a while. This finally proved not to be so much sand, as variations in sand temperatures, and consequent condensation on some plates. With fairly high temperatures, to about 110°F held pretty constant, plates can be heated uniformly to compensate.

The practical operating story, and the research underlying it could be an article in itself. Sufficient to say, good castings, low losses, and economies in handling and molding are the real measures of success. It is hoped that studies by others daring to seek "universal" or sands of wide range of application may add materially to foundry science and art.

Top management of the company recognizes the absolute necessity for teamwork in all phases of its operations, from initial development of product lines, on through manufacture, and in their merchandising.

In common with several other successful organizations having captive foundries, and research groups which serve all divisions of the company, many of the developments of alloys and metallurgical aspects are shared jointly by the production and metallurgical groups. This is in contrast to organizations which maintain research groups even physically removed from the manufacturing plants, and those in which manufacturing has direct authority over the metallurgists.

In other words, the primary responsibility of the works (and its foundry and pattern divisions) is production; that of the research group is development and professional experimentation. Pooling the skills of these groups results in highly effective approaches, to the advantage of the company and of all concerned. The evident shibboleth of these groups at Lunkenheimer is that so well portrayed in Dumas' *Three Musketeers* whose characters rushed to each other's help with the cry "All for one, one for all, that is our device!" The "one" in this case is the production of quality castings most economically, rather than the promotion of any particular individual or department. No doubt, such an attitude developed from realization by the whole company, from top to bottom, that all groups are dependent upon each other in reaching the ultimate goal. With that indoctrination, unselfish co-operation becomes as natural as breathing.

The foundry superintendent maintains a standards methods' card for each pattern. This card has adequate directions for the molder and the pouring crew. In case of hand work or unmounted patterns, the card also carries a photograph showing the gating and leading dimensions. Little or nothing is left to whim or guesswork.

As might be expected, these standard method cards

Castings in tote boxes are conveyed through the cleaning room for rough grinding and inspection

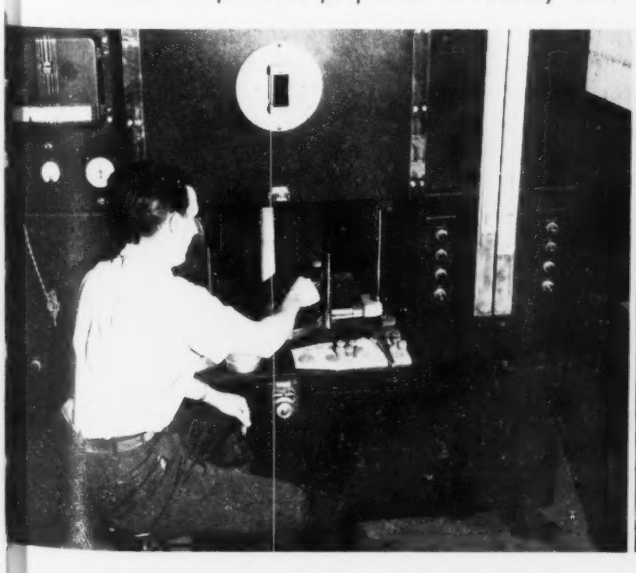
for each job are evolved by teamwork and study. A 5 x 8 in. card is filed for reference. The essential directions are transferred to the molder's job ticket.

In case of new designs, a sketch showing the principal features may be submitted to representatives of pattern shop, foundry, machine methods, and metallurgical groups. Suggestions relative to possible modifications which will promote easiest attainment of good quality and best economy are offered by any or all of the groups.

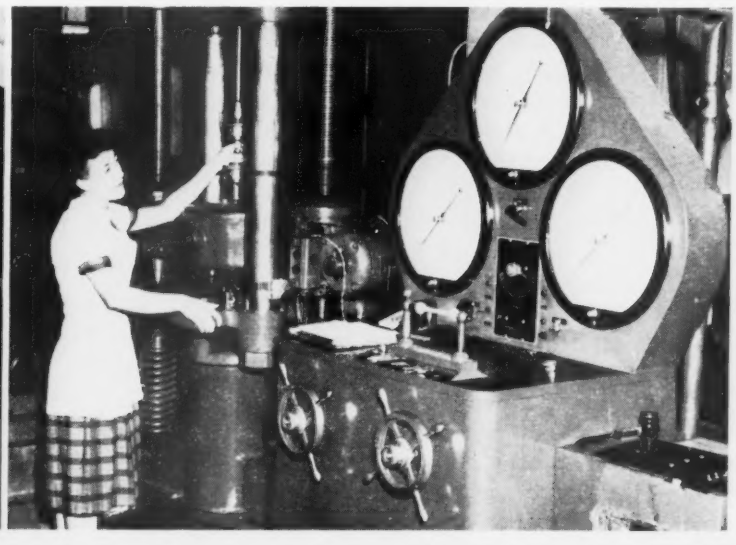
Sample or pilot castings receive very careful going over by the inspectors, and also are fractured or cut up in the laboratory to ascertain the internal soundness. When the full set of patterns is ready for mounting, in many cases the laboratory makes a layout sketch, based on suggestions by the pattern foreman, foundryman and metallurgists. Such sketches give all dimensional details of the runner-riser system.

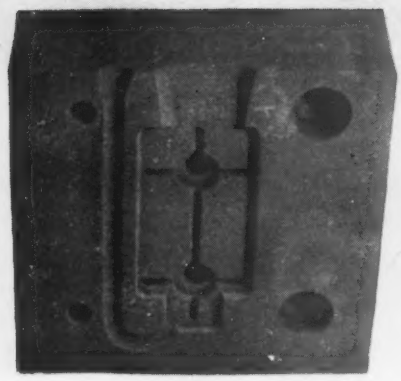
The "experimental" layout then is tried under foundry conditions to ascertain proper range of pouring temperatures, sound- (*Please turn to page* 267)

Laboratory technical staff member determining the elevated temperature properties of foundry sands

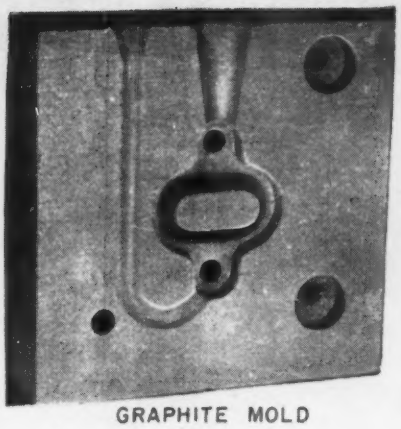


Physical properties are checked continuously for the foundry. Making a tensile test is shown here





GRAPHITE MOLD



GRAPHITE MOLD

GRAPHITE MOLD
TREATED WITH ETHYL SILICATE

REFRACTORY PERMANENT M

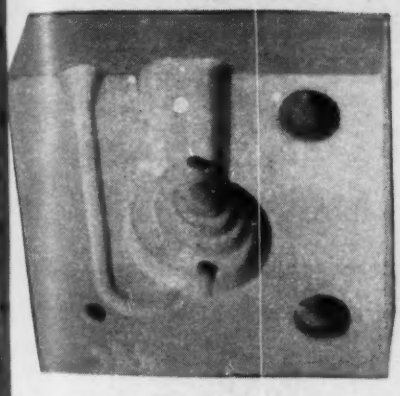
THE production of shaped castings is a relatively empirical science which owes much to the skill of individual workmen. Much of the skill involved in foundry practice is concerned with mold production, and the rapid expansion in the industry during the last decade has created a comparative shortage of skilled labor. Consequently mold production methods which enable intricate castings to be produced with a minimum of skilled labor—such as shell molding—are very attractive to foundry executives. At the same time, the very large number of jobbing foundries which produce a wide range of small castings will be unwilling to adopt new practices if they apparently deviate sharply from those already established. New methods should, in such cases, involve the installation of little additional equipment, and should not be beyond the capacity of the average foundry worker. If possible, the molds produced should be of a relatively permanent character.

Permanent molds have probably been used for castings production since prehistoric times, and various types of refractory stone have found application for this purpose until more suitable mold materials became available. A stone mold part and a bronze casting produced from this type of mold are shown here. These were found near Coventry, and date from the early 14th century. Metallic permanent molds and dies are widely used today in the nonferrous field, and to a lesser extent for the production of certain types of gray iron castings. Mold production costs are high, and tend to limit the application of such methods to large-quantity production. Casting design will also exert some influence in this connection since intricate design inevitably means extended machining time, and consequent high mold cost.

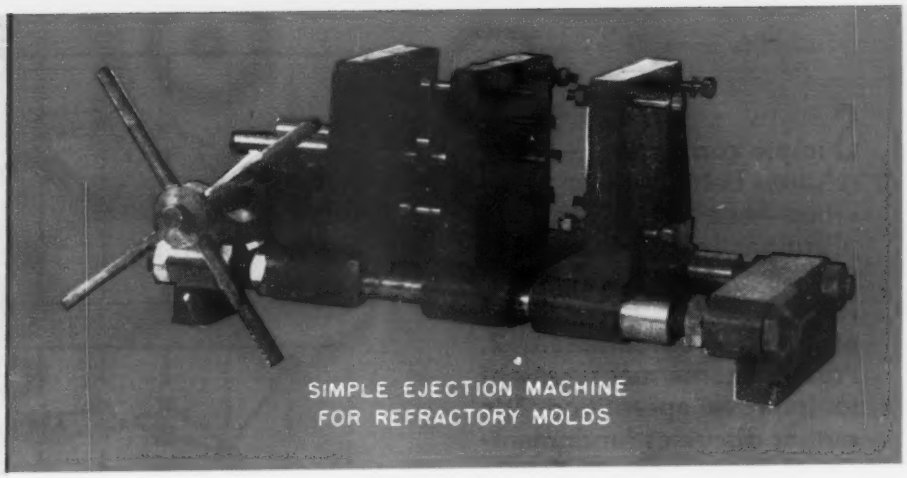
Special purpose machine tools are available for rapid mold machining, yet such equipment will usually be restricted to firms producing large numbers of permanent mold or die castings. Permanent mold castings can frequently be produced to closer dimensional limits than can those castings made in sand molds. Increased dimensional accuracy is a good selling point but is less important than casting cost. Mold life is limited by design, mold material, and by the type of alloy used in casting. The alternate heating and cooling of the mold faces can cause premature failure, if mold design is unfavorable. Failure is mainly due to cracking or crazing of the mold working faces, and may cause poor stripping qualities, impaired casting surface finish or reduced dimensional accuracy.

The majority of ferrous alloys have found application in permanent mold production, and several nonferrous alloys have also been used for this purpose. There is no ideal mold material, since the features thought to be desirable in some cases are not required in others. In all cases, however, rigidity and adequate thermal shock resistance are prime considerations. Mold materials of high thermal conductivity can be valuable where a rapid cooling rate is desirable; a high production rate is often associated with the use of such materials. When castings are required in alloys of low heat capacity or in alloys prone to undesirable structural changes when rapidly cooled, mold materials of *low* thermal conductivity are essential.

In most metallic materials thermal conductivity decreases rapidly with increase in temperature. Many light alloy castings can be successfully produced only if the molds are heated, either by continual use or by the application of external heating. Mold dressings can function as insulators if judiciously applied to the mold surfaces. In contrast, clean, sound, bronze castings are best obtained from molds maintained at a relatively low working temperature. Pure copper



GRAPHITE MOLD SHOWING WEAR



SIMPLE EJECTION MACHINE FOR REFRACTORY MOLDS

MOLDS

By J. B. McINTYRE
National Foundry College
Wolverhampton, England

molds are liable to oxidation and distortion at elevated temperatures, but the various copper-chromium alloys now available are harder and more resistant to oxidation. These alloys are readily machineable, and thermal conductivity values of approximately 50 per cent of pure copper can be obtained.

Gray cast iron is widely used for permanent molds, since it is rigid, free machining and comparatively cheap. The service life of such material is adequate for most purposes, and alloy cast irons are used when mold life must be prolonged beyond normal limits. Many highly alloyed steels are used for die production but find little application for permanent mold work where their high cost is usually prohibitive. Alloy steel molds of the nickel-chromium-tungsten type give extremely long service life; such materials are of very low thermal conductivity, yet this value remains constant over the usual range of working temperature. The latter characteristic is also a feature of many common refractory materials.

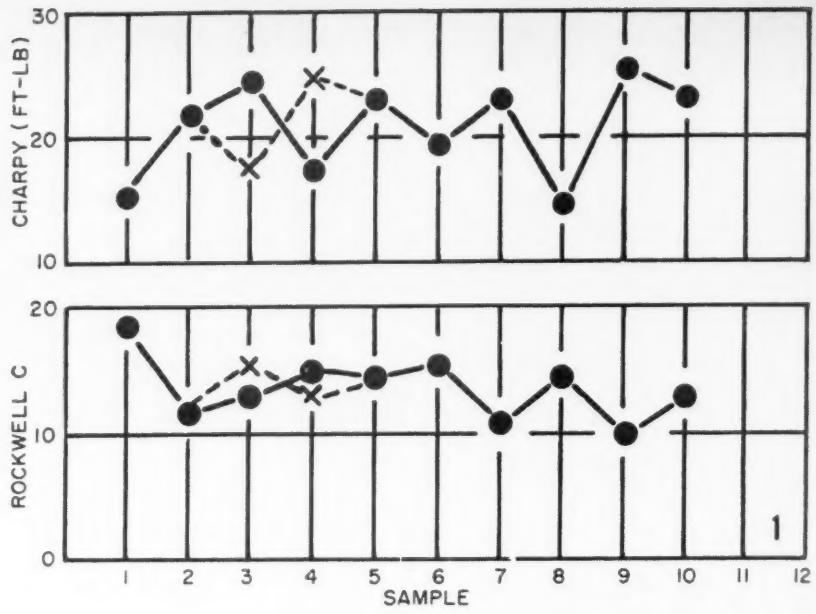
Sand and metal mold production techniques are not usually regarded as similar, yet at least one attempt has been made to bridge the existing gap. British Patent 330,018 indicates that iron molds of controlled density, thermal conductivity, and venting capacity, could be made from sintered iron powder. Other interesting methods which have been suggested involve the production of a stable foam by the treatment of metallic powders with flotation reagents, and the subsequent shaping and reduction of the mass. Many attempts have been made to produce cheap metal molds by direct casting in order to reduce machining costs. Such molds require very little machining, since most of the detail required is obtained in the original casting. Some of the useful heat-resistant alloys which have been discussed are unsuitable for this type of mold production.

The Parlanti process, developed in England during the recent war, involves the production of "cast to shape" aluminum alloy permanent molds. These molds were subsequently anodized to improve the working surfaces. The anodized surface is relatively refractory, and affords an excellent base for refractory dressings if these are necessary. Mold life depends upon casting design, weight and pouring temperature. Parlanti molds have been successfully used for light alloy components, and the high rate of heat extraction obtainable in these molds has enabled ferrous castings to be made on an experimental basis.

Mold production follows orthodox foundry practice in which wooden or plaster patterns are used, and if a sample casting can be obtained pattern costs are negligible. The sample casting can be embedded in molding sand to form an oddside, then coated with refractory wash. The first mold half is then poured around the refractory-coated, exposed portion of the sample casting. When solid, the cast assembly is removed from the sand mold, reversed, and the exposed surfaces coated with refractory wash; the second mold part can then be (*Please turn to page* 228)

English stone mold (14th century) and casting made in it

Simple correlation — the relation between two properties—has these main applications in the foundry: 1. Permits use of simple tests to secure information not otherwise obtainable. 2. Provides some measurement to improve operations. The author discusses fundamentals of correlation, its limitations and precautions to take in its application



SIMPLE CORRELATION *in the Foundry*

By W. K. BOCK
Research Engineer
National Malleable & Steel Castings Co.
Cleveland

SIMPLE correlation involves the study of the relation between two quantities or variables. It might be considered as experience with numbers attached. Some relations are well known—for example, the fact that hardness and tensile strength go up and down together is generally accepted in the steel foundry. Correlation study will tell the value of the strength within calculated limits corresponding to a given measured hardness. Similarly, the percentage of misruns on a given casting can be correlated with pouring temperature.

These two examples point out the two main uses of correlation in the foundry: (1) Use of nondestructive tests or simple tests to obtain information which would otherwise be out of the question, and (2) use of some measurement to improve operations. For example, only rarely are test bars taken from castings to check the strength of the metal in the product, but many castings are brinelled for this purpose. It is common practice to require the melter to tap only after the heat has attained a certain minimum temperature.

Correlation is a branch of statistics and as such is open to the commonly expressed objection, "You can prove anything by statistics." Levinson[1] agrees with this statement if both good and bad practices are included in the term "statistics." A comparable situation would arise if we said, "Chemical analysis can give any answer you want." If sharp pencil methods and accepted methods of analysis are both included in the term "chemical analysis," the statement could obviously be true.

It is not the intention of this paper to teach the methods and manipulations of correlation. This has been done by many authors, notably by Ezekiel[2]. Instead, we will present a nonmathematical discussion of the fundamentals, the limitations and the booby traps of the subject.

The use of historic charts in an effort to discover a relation is one mistake often made in correlation work. The general form of the historic chart consists of data plotted vertically against sample number, time or date, thus plotting the measured quantity in the order of production or testing of samples. Fig. 1 shows a combination of two such charts plotting Charpy and Rockwell of a steel against the order of testing.

In the figure the Charpy generally, but not always, increases with decreasing Rockwell, and vice versa. The amount of the change for a given change in hardness is not clear. If points 3 and 4 had been interchanged the result would be that shown by the crosses

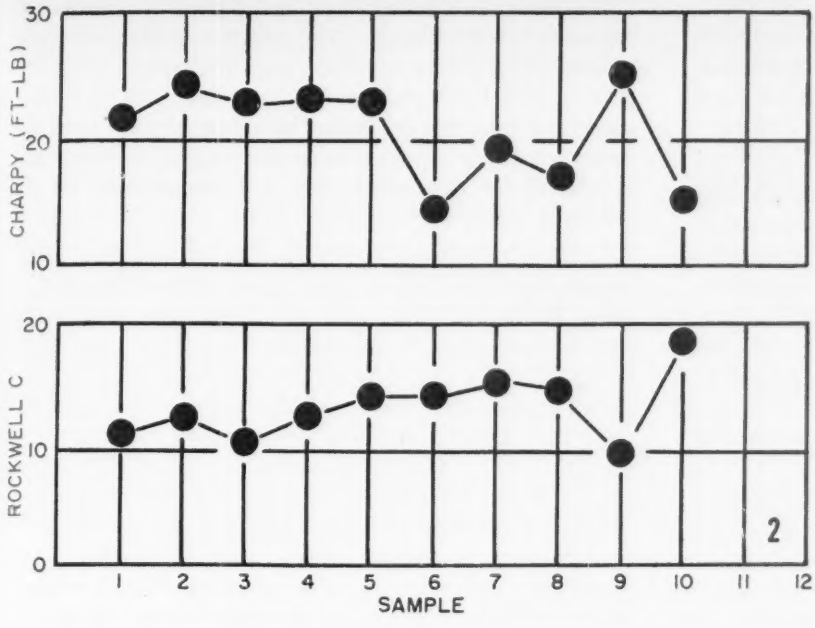


Fig. 1—Charts which plot Charpy impact values and Rockwell hardness against the order of sampling can give an erroneous impression of their relationship

Fig. 2—By changing the order of sampling a relationship opposite that shown in Fig. 1 is obtained

and dotted lines. Now the Charpy value always moves in the opposite direction to the hardness.

Since the order of testing was arrived at purely by chance, samples 3 and 4 could have been interchanged. In fact, any order of testing is as likely to occur as the one that did happen. Thus the order plotted in Fig. 2 might just as easily have been obtained, and if it had, the preponderance of evidence would have indicated that higher impact values accompany higher, not lower, hardnesses.

Here then, is a method which can give two different and contradictory answers from one set of data, depending on chance arrangement of a sequence of samples. It would seem that this method of analysis is not to be trusted.

If we are interested in the relation of one variable to another, there is no reason for not using a simple, direct and correct procedure for studying the relation. If we want to know the relation between carbon content and tensile strength, or between tempering temperature and hardness, or the effect of silicon on hot tearing, or any other relation, we can get a good start by plotting one quantity against the other. The order of business from this point on consists in determining the correlation coefficient (a measure of the degree of association between variables), checking its significance, and, if the amount of association is not due to chance, calculating the equation of a straight line relating the one quantity to the other. The manipulations for making all these calculations is given by Arkin and Colton[3]. Rider[4] is especially handy for his methods of making significance tests.

One might legitimately ask, why not plot the graph, put in a line and not fool with all the calculations? In Fig. 3, A is plotted against B and there is little doubt that A is a function of B and the drawing of the line presents no difficulty. For many purposes, plotting and drawing the line would be enough when the points line up as they do here. This type of plot might be found in plotting an electrical property such as resistivity against carbon for steel or fatigue strength as a function of tensile strength.

The graph of C as a function of D in Fig. 4 would not require any further work either, but for a different reason. The shot-gun pattern indicates clearly that C cannot be calculated from quantity D. If we plot moisture content of sand as a function of the relative humidity of the air, we might get such a plot as Fig. 4. Either the moisture content is not affected by humidity or the action of the sand conditioning system covers up any effect. No matter which interpretation is correct (and both might be) we would not read the relative humidity if we desire to know the moisture content of the sand, and so, as the pattern of points tells us, there is no use in proceeding with the calculations.

The points shown in Fig. 5 are a different story. The array suggests that E is related to F, and the correlation would be more evident if the two points marked by the arrows were discarded. Disregarding these points, there is a trend similar to that shown in Fig. 3 but with much more scatter about the trend line. Scatter, as was noticed, is characteristic of the no-relation case shown in Fig. 4. So we have two problems on our hands. What do we do about the marked points, and after that is decided, do we have a real relation between E and F?

We would like to discard the two marked points because they spoil the picture, but if we arbitrarily throw them out we are, in effect, selecting data which will show a correlation. This is a fine way to establish a false correlation. If we leave these points in without question, they will result in a larger spread about the line and may change the slope of the line so that if they should have been discarded and were not, they produce a distorted idea of the relation of E to F.

Care in handling points such as those marked in

Fig. 5 is more important in small samples than in large ones. The distorting effect of each of these points is relatively greater when there are only 14 points than it would be had the sample size been a hundred. In the latter case the contribution of each single point is somewhat more covered up by the effects of a number of other points.

This may suggest that the question of the marked points can be easily circumvented by taking more data. Aside from the fact that it may be physically impossible to get more data, there is no assurance that the added data, if obtained, will clarify the picture. If we doubled the number of points and all the new points fell among the closely clustered points of Fig. 5, that would be one thing, but if two or three of them fell outside like the marked points, we would be no better off than before.

Since we cannot dodge the problem we may as well tackle it. First, we might agree that any point can be discarded if there are known errors in the measurements involved. For example, suppose *E* is tensile strength and *F* is carbon content and we discovered after pulling a test bar that the counterweight in the beam of the testing machine was misplaced so the beam was way out of balance. Obviously, the recorded load and stress calculated from it contain not only the effect of carbon but also an error totally unrelated to the independent variable (carbon) of our problem. The point containing the incorrect stress should be discarded. It should be noted that nothing is said here about whether the point in question is a marked point of Fig. 5 or not. Any and all points containing known errors are to be discarded.

We can go a step further in discarding data. All points used in the correlation must come from material produced under the same practice. If the data are collected on chromium steels, for example, and by accident we included the carbon and tensile strength of a nickel steel, we would throw out the nickel steel data because our correlation, if it is established, is to be applied only to chromium steels and we do not know that the effect of carbon on tensile strength is the same for nickel and for chromium steels.

Sometimes our two variables are regularly plotted on quality control charts. When such a chart shows out of control it means something about the practice has changed, and since we do not know what effect, if any, the change has on the relation of the two variables, and since we are going to apply our equation only to material produced under standard practice, we discard all data from samples produced when the process is out of control. In no case, however, do we discard data without a sound reason.

Having settled on what data to use, we are ready to proceed with the calculations.

Since it is possible to compute the correlation coefficient directly from the data, a good order of calculation starts with computation of this statistic. Arkin and Colton[3] and many other books give methods of computing this quantity, so they will not be repeated here. Instead a discussion of this coefficient and its testing will be given.

The correlation coefficient, usually designated by the letter *r*, is a measure of the degree of association between two variables. The absolute value of *r* can be anything from zero to one, including both extremes, and the sign of *r* can be either plus or minus. Since the sign merely shows that the relation is direct (plus sign) or inverse (negative sign) we will disregard it for our discussion and concentrate on the absolute value.

If the plotted points fall exactly in line, the correlation would be perfect and *r* would have a value of one. If, at the other extreme, there was no relation at all between the two variables, *r* would be zero. Normally, the computed value of *r* falls somewhere between these two values, and the higher the value the more the association between the two variables, obviously. Since the condition of no correlation plays an important part in the significance test of the correlation coefficient, let us examine it closely.

Suppose two samples are tested for each of two quantities and that the quantities are totally unrelated. We would have enough data to plot two points on a graph. A line of best fit would join the two points and *r* would be one by calculation, although in the universe it is actually zero. Of course, the solution is trivial but it is an extreme example of how the value of *r* can depart from its true value. If data for three points were taken, the line of best fit would probably not touch all three and *r* would have some decimal value.

As more and more points are added the general trend would be for *r* to decrease in magnitude. No matter how many points we take we always work with a sample and not the entire universe. In any sample more or less points come close enough to lining up to give *r* some value other than zero.

Limiting the discussion to samples of a given size,

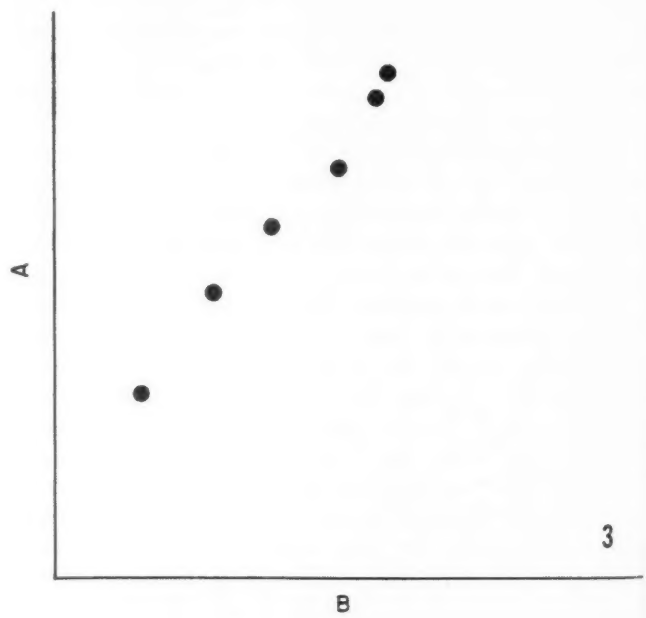


Fig. 3—Chart showing that A is function of B

it can be expected that in the first set of points a few will line up to give r some value greater than zero but less than one. (If r comes out greater than unity the arithmetic is wrong). Moreover, if the sample size is not very small, we should expect r to be close to zero. We repeat the experiment and the number of accidentally lined up points is different and so r has another value. Another repetition of the experiment will probably give a different pattern of points on the graph and a different r. We do not expect r to be very high, say 0.8, but it could happen. Repeated sampling from a universe where r is zero would give a large number of r's whose values would range almost through all the allowed values of the coefficient. There would be many values close to zero, the correct value, a few farther from zero and maybe a value or two close to unity. Thus we are led to the frequency curve for the correlation coefficient.

With this background we are ready to consider the significance test for r. The problem simply stated is this : If the computed value of r has a given value, say 0.4 as an example, are the two variables really related? The manipulations required for making the test are given in many books, Rider[4] for one. The basis of the test is the frequency curve of the correlation coefficient mentioned above.

In making the significance test we use what is called a null hypothesis. This is not the place to define nor to explain this concept but an example will show how it works. We want to know if a value for r of 0.4 represents any association of the variables or not. It was indicated above that in a universe where there is no correlation, there exists a certain probability of obtaining any given value of r by chance alone and this probability depends on sample size and magnitude of r.

Getting back to our r of 0.4, we make the assumption that there is no correlation (the null hypothesis) and seek a reason to discard the hypothesis. By proper methods we find the probability of obtaining a value as large as 0.4 in a sample of the size which we used, if there is no association between the variables. If this probability is less than 1 in 20 we say the observed coefficient is significant based on a 5 per cent confidence limit. Therefore, the association is real.

If, however, there is more than one chance in 20 that an r of 0.4 could be obtained by chance in a universe where r is properly zero, we do not have enough evidence to discard our null hypothesis and we conclude that r is not significant and so we have not shown that our two variables are correlated.

It should be noted that we say it was not shown that correlation exists. This is not the same as saying correlation does not exist.

To be able to say no correlation exists we would have to base the null hypothesis on some value of r which indicates some degree of correlation and then find reason to discard the hypothesis. Any value of r other than zero means some correlation and every value is open to the criticism that it always represents some chance of occurrence in a noncorrelated universe. The value zero is unique and the only satisfactory base for this significance test. The test thus results in either the statement that the correlation is significant or that it was not shown to be significant.

The reason for using a 5 per cent confidence limit is that it is commonly used by statisticians. A 1 per cent or 10 per cent or any other limit could be used but should be decided on before making the test.

In Fig. 6 the lower curve shows the smallest value of r for a given sample size which will be significant based on 5 per cent confidence limit. Fisher[5] gives a table of the minimum values of r for confidence

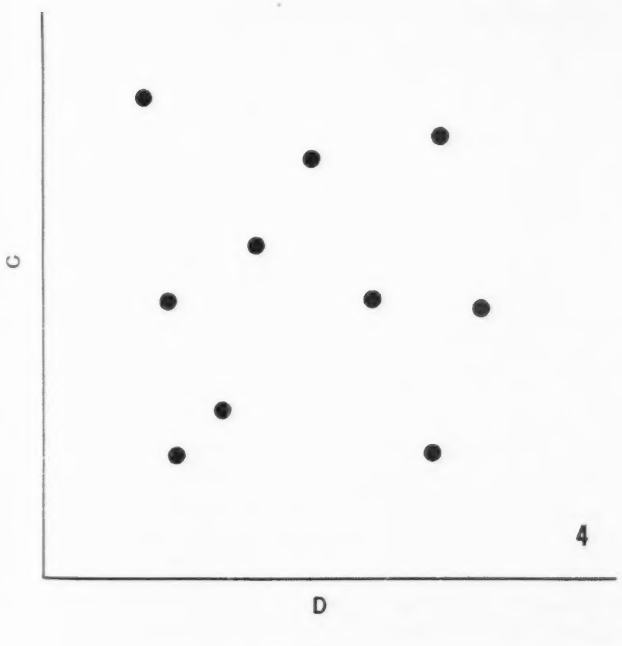


Fig. 4—C obviously cannot be calculated from D

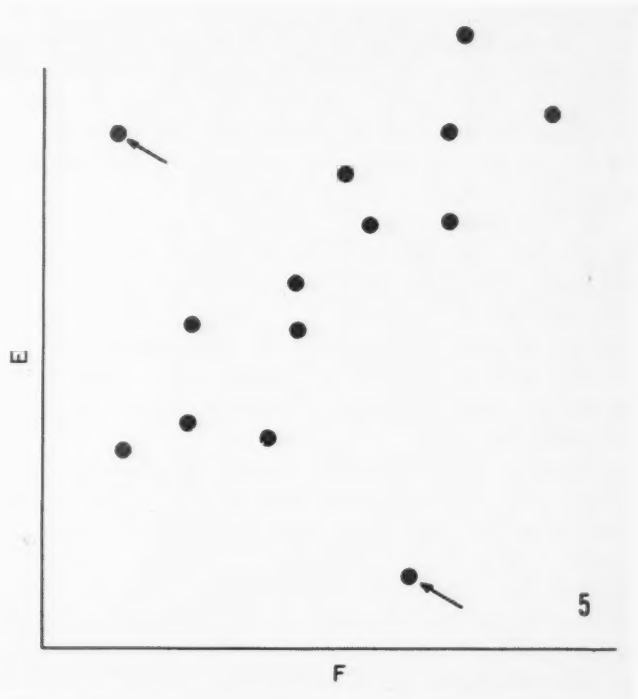


Fig. 5—Showing relationship but some scatter

limits of 1, 2, 5 and 10 per cent and for various sample sizes.

A word about cases where r is not significant may be in order. In such problems we are stopped. No conclusions can be drawn safely. Perhaps refining our measurements and taking new data might help, but as far as the work which had been done is concerned we have learned nothing definite. Merely taking more data without refining the method is almost always futile.

If the r which was found is significant we are ready to calculate the line of best fit. If we consider the points of Fig. 5 the equation will be of the form

$$E = a + bF \quad \ldots\ldots (1)$$

where the intercept a is the value of E when F is zero and b is the slope of the line; that is, the amount E changes when F changes one unit. If there were absolutely no relation between E and F, the constant a would be equal to the average E, and b would be zero. While both a and b can be checked for significance the test of b is usually sufficient.

As we saw in the case r should be zero, there is always a chance of enough points nearly lining up to give a value of r other than zero. These same points cause b to have some value other than the expected zero. From this point on the argument establishing the idea of a frequency curve for b, its use in making a significance test, the null hypothesis that b is zero and the interpretation parallel exactly the corresponding steps in testing r.

Where no correlation exists both r and b are zero but r is limited to a maximum value of one for perfect correlation, while b is not limited. However, the relation

$$r = c\,b \quad \ldots\ldots (2)$$

holds. The term c is the ratio of the standard deviation of the dependent variable to that of the independent. By using the relation (2) and the definition of standard deviation it is possible to reduce the result of the significance test of b to a result in terms of r. The upper curve of Fig. 6 shows the minimum value of r for any given sample size which will make b significant. The small difference between the curves of the figure is probably due to the two different distributions used, one for r, the other for b.

The standard error of estimate is now all we need to complete the problem. This statistic is a measure of how closely the data fit the calculated curve. It permits us to calculate the limits between which future data will fall and so we can estimate the accuracy with which we can predict the value of the dependent quantity from a given value of the other quantity.

Before proceeding with a numerical example, there are a few points which could be noted. First of all, the discussion has been confined to straight lines because this is the simplest curve and the most used. In very few cases do we know what shape the curve should have and so a straight line is as good as any other. Where a curve is indicated, transforming one of the variables to its logarithm, a square or some other form, and using the transformed variable instead of the variable itself, reduces the curve to a

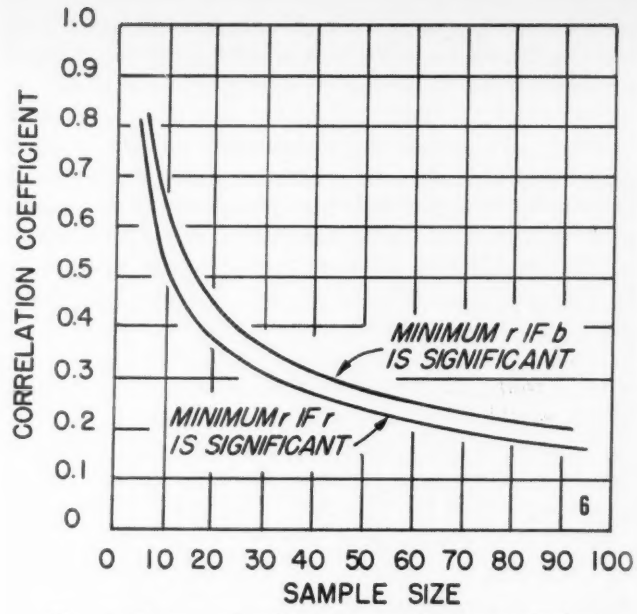


Fig. 6—Curves of minimum correlation coefficient

straight line. In another case the relation between two variables may be a curve but our data or our interest may be confined to a short range of one of the variables; consequently, for this case a straight line is as good as the more complex equation of the curve for the short length of line with which we work.

The approximation just mentioned and the uncertainty of the exact form of the equation lead to a prohibition on extrapolation. If we determine tensile strength as a function of carbon, using data where the carbons range from 0.20 to 0.80, we would not use the equation to calculate the strength of a 1.30 carbon steel. We might get away with it but we cannot know that we would, so to be safe we refrain.

To illustrate the discussion we use a numerical example. In Table I are listed the values of Charpy and Rockwell C for a steel. These are the data plotted in Figs. 1 and 2 and are listed in the order of plotting in Fig. 1.

TABLE I.

Charpy (ft lb)	Rockwell (R_c)
15.2	18.5
21.7	11.4
24.3	12.9
17.1	14.9
23.0	14.3
19.3	15.3
23.0	10.8
14.6	14.4
25.3	9.9
23.2	12.9

The data are plotted in Fig. 7. Notice that no matter in what order the pairs of values are listed in Table I the pattern of points in Fig. 7 is the same. Compare this with the historic chart.

Since we have no reason to doubt any point, all are used in the calculations. First, we find that the correlation coefficient r is -0.77 which, according to Fig. 6 for sample size of ten, is significant and will yield

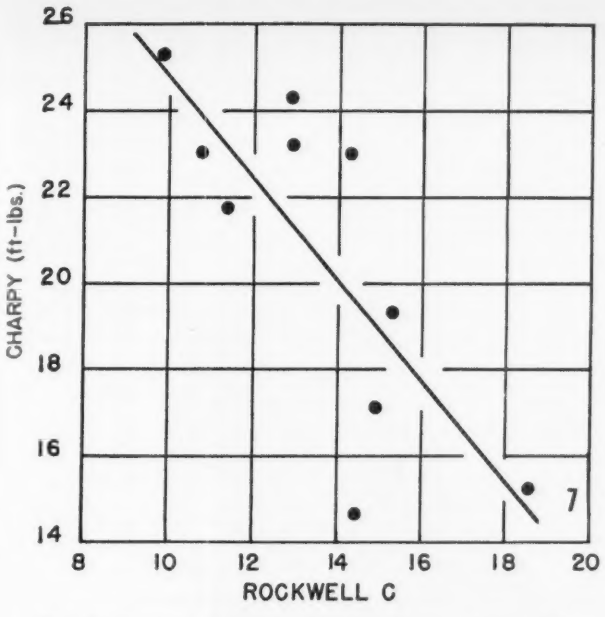


Fig. 7—Impact resistance vs. hardness of a steel

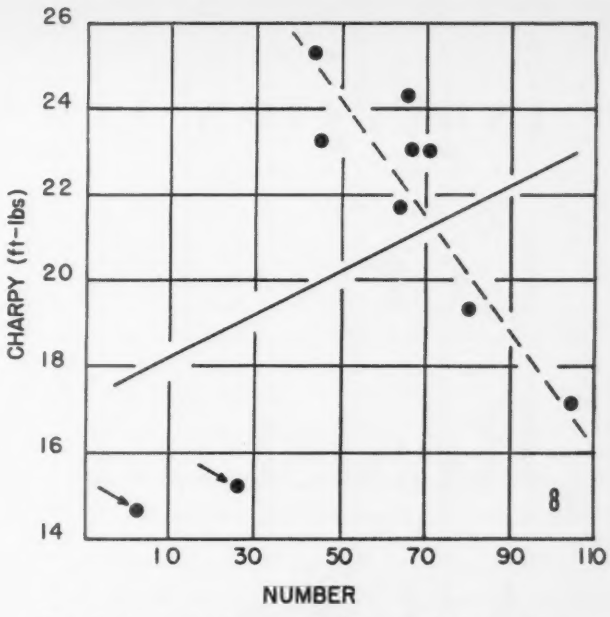


Fig. 8—Impact plotted against random numbers

a significant slope. Next we compute the equation

$$C = 36.62 - 1.179\ R \quad \ldots\ldots (3)$$

where C is Charpy value and R is hardness. The standard error of estimate is 2.34 ft lb compared with the standard deviation of 3.67 ft lb, showing the improvement in estimating the impact resistance of this steel if we know the hardness.

The data in Table II which are plotted in Fig. 8 illustrate how not to do correlation.

TABLE II.

Charpy (ft lb)	Number
15.2	26
21.7	64
24.3	66
17.1	94
23.0	71
19.3	75
23.0	67
14.6	2
25.3	44
23.2	45

In Table II the impact resistances were listed in order of testing (although any other order would do as well) and under "number" are listed a sequence of numbers taken from a table of random numbers. So we have the ten pairs of values plotted in Fig. 8. Since the data for one point is as good as that for any other as far as we know, it is necessary to use all the data. We find that r is 0.38, which is not significant, so we have not demonstrated that impact resistance is related to numbers from a table of random numbers. This is hardly surprising.

Although we have no excuse for calculating the equation, we did so and found it to be

$$C = 17.62 + 0.055N \quad \ldots\ldots (4)$$

where N is the number.

Had we calculated the equation first and chosen to ignore significance tests we might have been tempted to base conclusions on the indicated relation. Of course, the absurdity of the relation is apparent in this case but in problems where someone says, or hopes, that the relation is possible, we often find equations used which have no more significance than equation (4).

Finally we notice the two points on Fig. 8 which are marked by arrows. If they could be eliminated the correlation would be improved. We saw above that we had to use them because they are obtained exactly as all the rest were. However, let us argue that they stand so far from the rest that there must be something wrong with them and maybe the trouble is so obscure we just have not found it. (This is nearly equivalent to saying, "Let's discard them because they spoil the picture".)

If we use only the remaining points we find r is 0.83, which is significant, and the equation is:

$$C = 31.2 - 0.139\ N \quad \ldots\ldots (5)$$

and the standard error of estimate is 1.41 ft lb which is better than that for equation 3.

So we are led to the conclusion that picking a number from a table of random numbers permits us to estimate the impact resistance of a steel and, besides, the estimate arrived at this way is better than that made from a knowledge of the hardness of the steel.

Fortunately, there is another conclusion. By ignoring the rules for discarding data we have hand-picked data which have resulted in a false correlation.

It is hoped that the numerical examples show clearly the use of significance tests and that the restrictions and requirements which have been mentioned are necessary and not window dressing.

Bibliography

1. Horace C. Levinson—"The Science of Chance"—Rinehart & Co., Inc., New York.
2. Mordecai Ezekiel—"Methods of Correlation Analysis"—John Wiley & Sons Inc., New York.
3. Herbert Arkin and Raymond R. Colton—"An Outline of Statistical Methods"—Barnes & Nobile Inc., New York.
4. Paul R. Rider—"An Introduction to Modern Statistical Methods"—John Wiley & Sons Inc., New York.
5. Ronald A. Fisher—"Statistical Methods for Research Workers"—Hafner Publishing Co., New York.

INDUCTION FURNACE MELTING OF

Corrosion-Resistant Alloys

By B. SPINDLER
Foundry Manager
Alloy Steel Products Co.
Bloomfield, N. J.

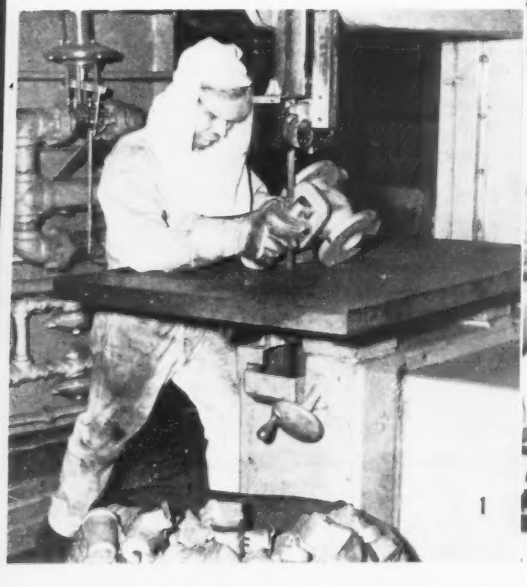


Fig. 1—Cutting off casting gates and risers on bandsaw

Fig. 2—Gates and risers, with composition definitely checked by analysis of each heat, make up a large part of each charge

CASTINGS used for corrosion-resistant valves must be pressure tight and made to extremely rigid analysis specifications. Shapes cast are frequently quite intricate, requiring complex coring. Foundry technique is further complicated by the inherent difficulties involved in casting nickel-base alloys and high-alloy stainless steels. The Foundry Division of Alloy Steel Products Co., Linden, N. J., worked out methods that successfully meet these requirements. Parts cast at Aloyco's Bloomfield, N. J., foundry include valve bonnets, bodies, gland plates and followers, disks, packing nuts, trim parts—everything but the stems and handwheels of the company's line of corrosion and heat-resistant valves. The castings range in size from an ounce to 200 pounds. Larger castings are purchased from outside sources.

Nominal compositions of the various alloys used in the foundry are shown in Table I on a following page. Carbon content is kept below 0.07 per cent for most alloys, and rarely required above 0.12 per cent. Other elements, as indicated in the table, are controlled within correspondingly close limits.

Present production melting equipment consists of two 600-lb Ajax-Northrup induction furnaces, powered by a 175-kw, 960-cycle motor-generator set. Only one of the furnaces is in operation at a time; change over from one to the other is made merely by throwing a pair of switches. A small converter-operated induction unit is used chiefly for experimental work.

Two basic problems encountered in working out casting techniques were control of analysis within the required close limits, and control of the physical uniformity and homogeneity of the castings. Analysis control involved accurate weighing of the metals composing the furnace charge, and close control of losses during melting. Obtaining consistently uniform castings required determination of optimum pouring temperatures for each of the alloys handled, devising methods for obtaining those temperatures, and working out the best molding techniques and gate and riser design for each type of casting.

Two of these problems—control of losses while melting, and control of pouring temperatures—were solved by use of induction furnaces for all melting. Metal losses are very small and the slight changes in composition that do occur are readily predictable.

Pouring temperatures are controlled by simply varying the power to the furnace coils. By pouring from the furnace into small ladles, and maintaining the remainder of the charge in the furnace at the desired temperature until all metal has been cast, it is possible to pour most heats within a range of $\pm 20^{\circ}$F.

Most heats are made with 60 per cent scrap, consisting of gates and risers from previous heats, and 40 per cent steel, ferroalloys, or special ingots. A complete analysis is run on every heat, both as a check on melting practice and for use in figuring scrap percentages for subsequent heats. All elements of the charge are carefully weighed on a scale graduated in 0.1-lb. and the scale itself is checked frequently for accuracy.

Furnace linings are basic, being made up by ramming dry Normagal between a crucible-shaped transite inner form and the furnace coil, which previously has been protected with an air-setting plastic refractory cement. The inner form remains in place during the melt-down, and holds its shape long enough to permit the granular refractory to sinter to a suf-

Fig. 3—Molten metal being tapped into a teapot type ladle. Note general absence of fumes

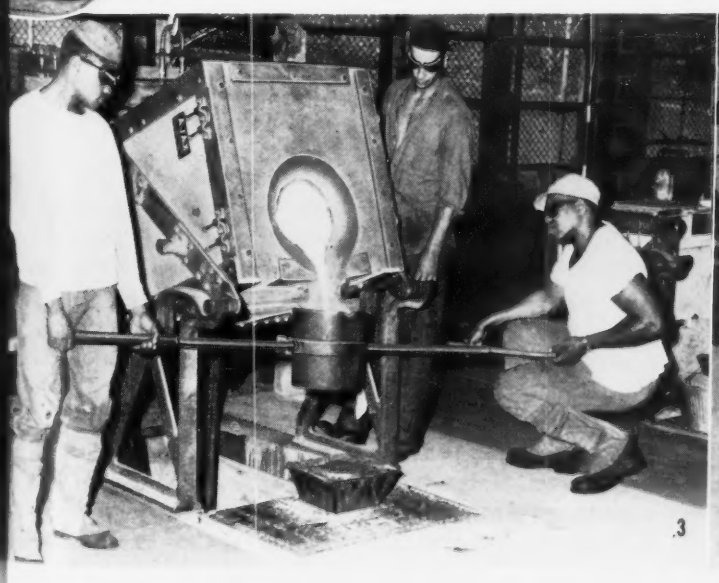
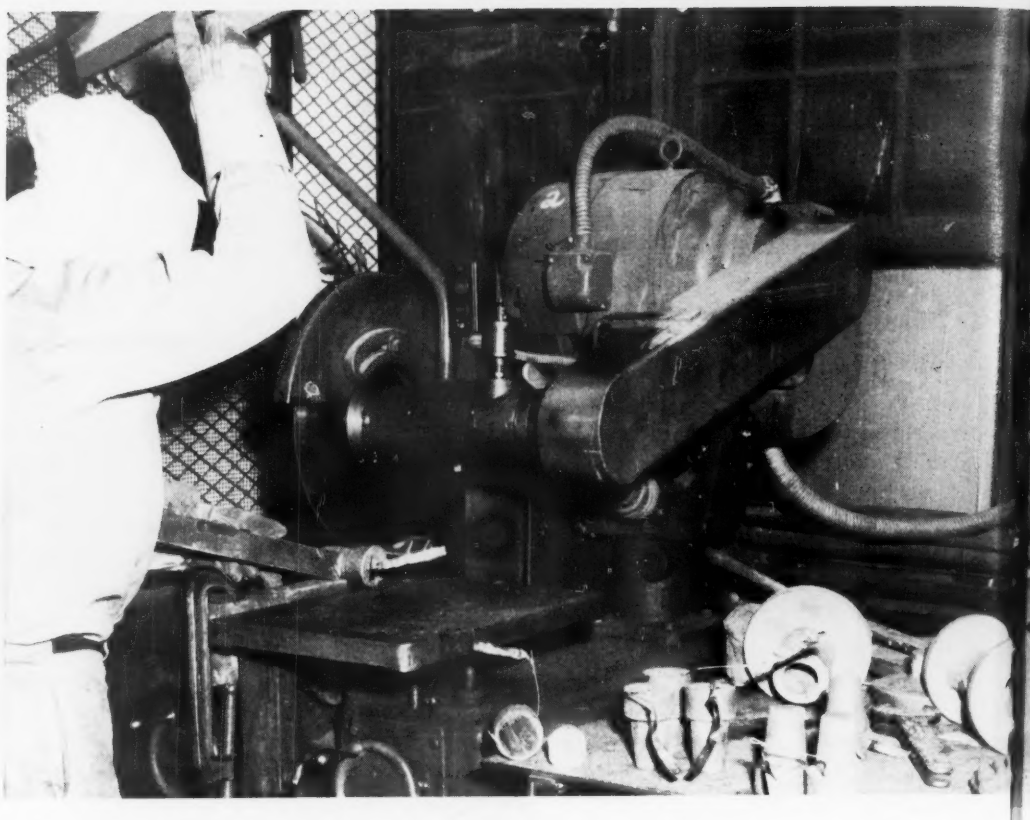


Fig. 4—Molds are brought to pouring floor on dolly trucks. Pouring a 600 lb heat takes about 5 minutes

Fig. 5—Melting department and pouring floor layout, Alloy Steel Products Co.



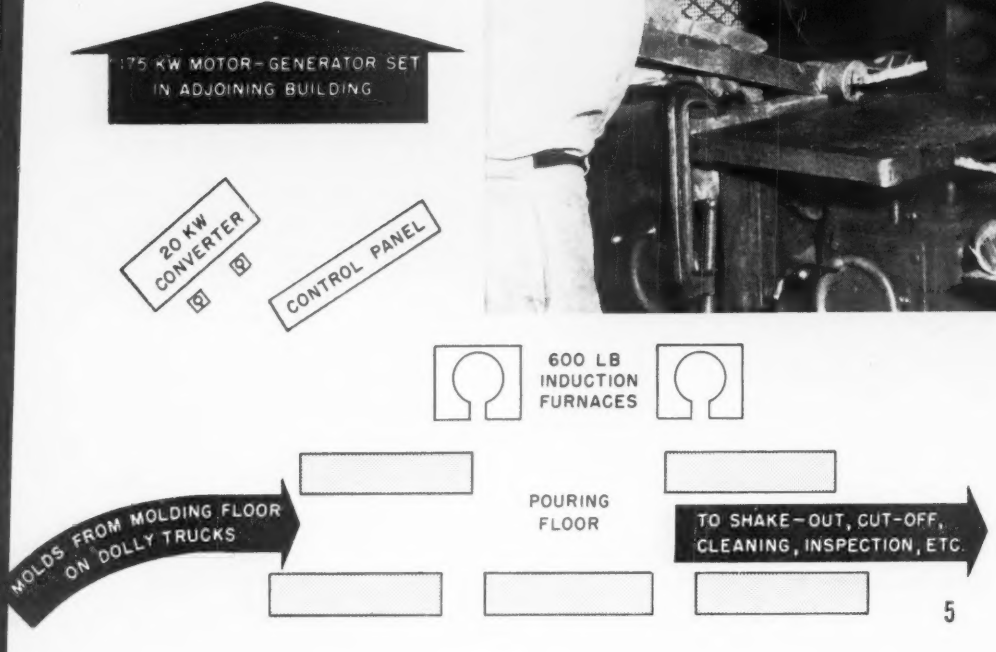

175 KW MOTOR-GENERATOR SET IN ADJOINING BUILDING
20 KW CONVERTER
CONTROL PANEL
600 LB INDUCTION FURNACES
MOLDS FROM MOLDING FLOOR ON DOLLY TRUCKS
POURING FLOOR
TO SHAKE-OUT, CUT-OFF, CLEANING, INSPECTION, ETC.
5

Fig. 6—Abrasive cut-off wheel is used for removing gates and risers from the large castings

ficient depth to be self-supporting.

Molds are made according to standard green sand practice, using synthetic sand for the molds, and oil-sand for the cores. Gates and risers are somewhat larger than usual, and considerable experimentation is required for each type of casting to determine the most effective designs. Although the foundry is equipped with squeeze-type molding machines, most molds are hand-rammed with pneumatic rammers.

Molten metal is transferred from the furnace to the molds in teapot type ladles for smaller pieces, and with standard lip-pour ladles for the larger items. As soon as the last of the molten metal has been poured from the furnace and any slag build-up removed from the crucible walls, a new charge is loaded.

The entire melting cycle for 600-670-lb heats averages out at about an hour and ten minutes. Of this, an hour and five minutes is required for melting and superheating, and five minutes for pouring. Charging time is practically negligible. Even when changing alloys, it usually is only necessary to be sure that all metal has been poured from the previous heat before loading the new charge. With that precaution no carryover of elements is experienced even when switching from a high-chromium alloy such as 18-8 to nickel alloys with no chromium.

The high speed of the melting cycle, not only in the actual melting but in the negligible loss of time for re-charging, permits realization of an output that is far in excess of the nominal furnace capacity. During a recent nine-month period, with never more than one 600-lb furnace in operation at a time for an average of 18 hours a day, six days a week, Aloyco's four-man melting crew poured over 120 tons of stainless steels and nickel alloys per month.

After the cooled castings are shaken out of the molds, they are blast-cleaned, gates and risers are cut off, and surfaces are rough ground. Almost all castings are heat treated at the rate of one hour per inch of section at 2050°F, and then waterquenched. Some of the more complex nickel-base alloys are heated to somewhat higher temperatures, and must be air cooled. After heat treatment, the castings are again blast-cleaned, pickled and inspected.

When casting practice is first being developed for a given part, extensive tests are made to check the soundness of the castings, mainly by sectioning and etching the pilot castings. Once the techniques are

Fig. 7—Almost all castings receive heat treatment

Fig. 8—Checking completed castings before shipment

worked out, however, casting control is sufficiently reliable that a thorough visual inspection of the castings is adequate. The castings themselves are not pressure tested individually, as it has been found that occasional rejection of a finished part is more economical than pressure-testing all castings before they are machined. The finished valves, of course, are thoroughly tested.

Induction furnaces have an electromagnetic stirring action that is of considerable value when adding heavy, high-melting-point materials, such as tungsten or molybdenum, to the melt. These elements tend to sink to the bottom of the furnace, and without some form of agitation, a considerable period of time would be required for them to dissolve and circulate the melt.

An incidental advantage found to be of considerable value in producing closely-controlled, high-quality castings is the absence of noise, fumes and external heat. Except when a heat is actually being poured a casual visitor to the shop would probably not notice that melting was in process.

A layout of the casting area of the foundry is shown in Fig. 5. The control panel is equipped with standard electrical metering equipment, the main line breaker that energizes the equipment, and a simple rheostat and voltage regulator that provide full control of power to the unit at all times. Unity power factor is maintained throughout the heat by means of a group of pushbutton-operated capacitors. Operation of all controls is extremely simple, no particular skill being required.

TABLE I—Nominal Composition of Alloys Used

Type of Alloy	Chromium	Nickel	Molybdenum	Copper	Silicon	Carbon	Iron	Mn	Other Elements
Alloyco 18-8S	19–21	8–10			0.80	0.07 Max.	Bal.	0.70	
Alloyco 18-8SMo	19–21	9–11	2–3		0.80	0.07 Max.	Bal.	0.70	
Alloyco 18-8SCb	19–21	8–10			0.80	0.07	Bal.	0.70	Columbium 10 x carbon
Alloyco 20	19–21	28–30	2–3	3.5–4.5	1.0–1.5	0.07 Max.	Bal.	0.70	
Wirthite	20	24	3	1.50	3.5	0.07 Max.	Bal.	0.70	
Nickel		97			1.5	0.35	0.50	0.70	
Monel		67		29	1.25	0.10	1.5	0.60	
Inconel	13.5	77			1.50	0.10	6	0.70	
Alloyco N-2		65	28		0.50	0.06	6	0.50	
Alloyco N-3	15	56	16		0.80	0.06	6	0.50	Vanadium 0.30 Tungsten 5.0

QUESTIONS

Pinholes Caused by Wet Sand

Q.—Please examine the enclosed gray iron stove door panel casting. It has to be enameled and the pinholes result in defective work. In your opinion are the holes the result of a sand or iron condition? We find that they appear in both cope and drag in line with the gates along one edge. They do not appear on the ends away from the gates. We are using No. 1½ Albany sand, and the iron charges are composed of one-third each of pig iron, cupola cast scrap and home scrap.

A.—Examination of the casting leads us to believe that the small holes on both cope and drag surfaces are mainly due to the sand being on the wet side, although there is some indication of broken edges resulting in some sand wash. However, the broken edges may occur before the mold is closed, and the little sand wash indications may be caused by not blowing out the loose particles in the drag before closing. Possibly it might be due to the sand being slightly on the "tight" side so that the steam generated does not escape as readily as it should.

It may be that while the sand originally was No. 1½, the heap may have become loaded with considerable fines during long use which reduces the permeability. Sand with considerable fines requires addition of more than the average moisture content to give it the proper feel to the molders; hence the sand tends to be on the wet side.

Water Chilling of Pipe Coils

Q.—Is any information available on the technique of chilling or cooling stainless steel pipe coils while copper or brass is poured around them as in making electrode holders or water-cooled neck bearings?

A.—You do not mention why you want to cool or chill the stainless pipe coil, but apparently you are having trouble with the metal cutting through or perhaps with the coil shifting around. If it is the former, it appears to us that a change in gating so that the metal stream does not impinge directly on the coil is a much better procedure than trying to water-cool the pipe. The same might be said with reference to the coil shifting or snaking around due to expansion from heat of the molten metal. Use of sufficient chaplets to prevent shifting would be preferable.

Use of water around a pouring floor is rather hazardous. If water cooling is to be used, the area should be away from the regular operations so that proper attention will be given to the fact that water is likely to be present in other places than in the piping. Presumably the pipe coil to be placed in the casting is equipped with a threaded connection of some kind. This is essential to prevent any leakage at the mold. Water should not be turned on and allowed to run for any length of time before pouring because it may cause condensation of moisture from the damp mold sand. Naturally, all connections should be tested beforehand to be sure they are tight. Preferably the water should be turned on in the coil shortly before pouring the metal, and allowed to continue until the metal has solidified.

Use Charcoal for Cupola Fuel

Q.—Was there ever a time in foundry history when hardwood charcoal was used to melt iron in the cupola? If so what was the size of the cupola and how much charcoal and iron was used for the bed and the charges?

A.—Since charcoal was the first fuel used for smelting iron in the crude melting units before Dud Dudley, Worcester, England, in 1619 obtained a patent for use of pit or seacoal for the purpose, it is quite likely that it was also employed in the cupola. Moldenke, in his book *Principles of Iron Foundry*, mentions that early Swedish cupolas used charcoal, employing 55 to 75 lb per 100 lb iron. Kirk, in his book *The Cupola Furnace*, states that charcoal was "the first fuel that was used in this country in smelting iron from its ores and also in cupola practice, and for many years it was the only fuel available for these purposes. It produced a superior iron in many respects to that obtained with fuels in general use at the present time, but with the increase in population and disappearance of the forests, charcoal is no longer available for this purpose; except in mountainous districts where land is worthless for any other purpose than the growing of timber, or in thinly populated districts where forests have not yet been destroyed."

He then describes his experience with melting in the cupola with charcoal as the fuel. Cupolas were 20 to 30 in. ID. He used shavings and soft wood for ignition purposes, and placed on this the charcoal bed extending 18 to 20 in. above the tops of the tuyeres. He said it was customary to fill the cupola with stock before lighting the fire, and to turn on the blast as soon as the charcoal was ignited. Kirk said that charcoal does not carry as heavy a burden as coke or coal, and the charges of iron are made lighter and more numerous. Blast should be lighter than with the harder varieties of fuel. Fuel charge is made 6 in. deep. He states that when charges of

and Answers

fuel and iron are properly proportioned, iron may be melted sufficiently hot to run the lightest of castings at the ratio of from 3 to 4 pounds of iron to a pound of fuel.

If we assume that charcoal weighs about 28 lb per cu ft, then the iron charges in the 20-in. cupola with a 6-in. charcoal split would range from 90 to 120 lb, and in the 30-in. cupola from 200 to 275 lb. However, the best procedure would be to lay out a 20 or 30-in. ring of brick, 6 in. high; fill it with charcoal and weigh the charcoal. From that you could then determine the amount of iron to be used.

Place Trade Mark on Patterns

Q.—Will you please advise the best method of placing a brand or trademark on brass and aluminum plated patterns? It will not make any difference whether raised or depressed lettering is employed.

A.—Since the application of the brand or trademark was omitted when the patterns were made, we believe the most logical procedure would be to make or have some one make the design or insignia in brass for the brass patterns and aluminum for the aluminum patterns, but only one could be used, and then sweat-solder them on. Preferably a single size insignia which could be applied to all patterns should be selected for economy as well as to eliminate the possibility of placing the wrong size on a given pattern.

Possibly a steel stamp could be used, but only on plates with the patterns on one side. Even then we would expect some distortion or bulging at the stamp edges, not to mention nonuniformity of impression unless the application of the stamp was made by a press in which the pressure could be regulated or controlled. Also, unless the pattern and plate were firmly seated during the marking, the plate might become distorted.

Cement Sand for Copper Alloy

Q.—Have you any information on use of cement molds or cement facings for pouring copper and bronze?

A.—Use of cement-bonded sands for molding nonferrous castings is not new and the practice for making large propellers was described in the September and October, 1943 issues of FOUNDRY. Essentially the sand employed is a clay-free silica type of about 45 to 50 AFS fineness. About 13 per cent high early strength cement is added and the two mixed dry. Then around 6 per cent moisture is added. Material is handled like ordinary green sand. However, it should be used within 2½ hr after mixing under usual atmospheric temperatures of 70 to 80°F. In hot weather (100 to 110°F) the water content may be increased to not over 8 per cent, and the sand must be used within an hour after mixing.

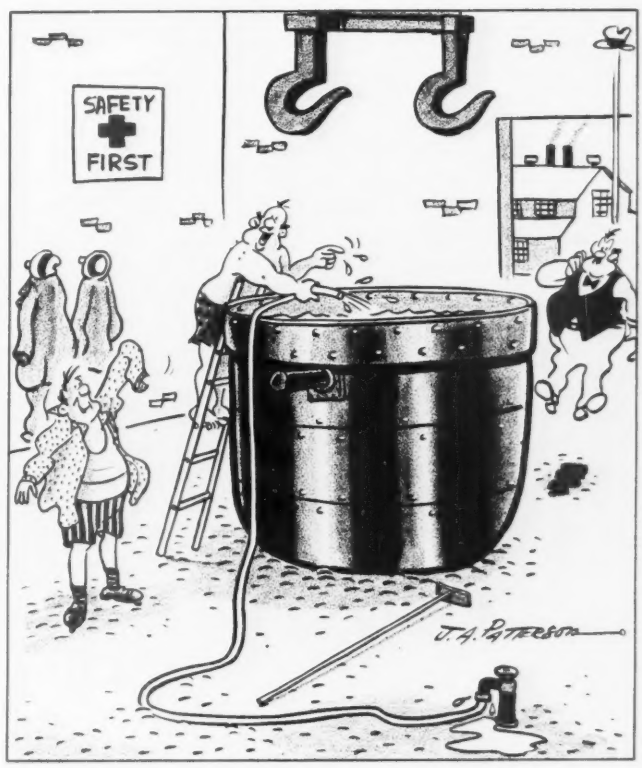
All new sand mix is used for facing at all times. Backing sand may be crushed, used cement sand mixed with 10 per cent cement. Moisture content is around 7 per cent. Molds must air dry 72 hr before metal can be poured. If the mold is made in sections, the sections are allowed to air dry 4 to 6 hr so that they will be stiff enough to move without difficulty. No flasks are needed; easily knocked together wood forms are employed to hold the sand while ramming up.

Line Hand Ladles Mechanically

Q.—Several years ago in FOUNDRY we read a description of a clever method for lining hand ladles. At the time we were not particularly interested since we were not pouring our castings from hand ladles. At present we use hand ladles exclusively. Our recollection is not as clear and sharp as it might be. We shall appreciate your kindness in looking up the item and sending us a clipping or a copy.

A.—The man who supplied the item in the first place added a touch of human interest. The idea came to him as a result of watching a robin lining the interior of its nest with mud. After a sufficient amount was plastered on the nest wall, the robin climbed inside and revolved slowly, thus imparting a smooth,

GANGWAY! By J. A. PATTERSON



"Do you like yours pretty warm, or just tepid?"

uniform surface to the mud lining. The ingenious middlewest gray iron foundryman—and nature lover—developed a mechanical method for lining his hand ladles which presents many points of superiority over the usual hit or miss hand lining method.

The empty hand ladle is placed in a hinged clamp on the table of a discarded drill press. A double handful of lining material is placed in the bottom of the ladle. The drill press spindle, equipped with a cast iron form the shape of the inside of the ladle, gradually is lowered. The spinning form forces the mud against the bottom and side walls of the ladle. The superfluous material falls over the top on the outside. An automatic stop regulates the thickness of lining material on the bottom of the ladle. In advance a number of lip pieces are made in a metal corebox and dried. One of these lip pieces is pressed by hand into the wet mud at the top of the ladle. The entire assembly then is dried in the oven. The device has been in use for many years with the original form showing no sign of wear.

Igniting Cupola Bed With Gas

Q.—We use two 28-in. ID cupolas in our foundry located in Italy in which the bed is ignited by use of wood. However, we have natural gas at our disposition, and we would like to know whether we can use it for ignition and how it can be done.

A.—Since a number of foundries in this country use natural gas with suitable burners to ignite the coke beds in their cupolas, there is no reason why you cannot do it successfully. Either of two procedures may be employed. In one the cupola must be equipped with what is termed a "kindling" door—that is, an opening through the shell and lining about 4 in. above the sand bottom into which the burner is inserted. In this method a layer of coke is placed on the sand bottom, and then a Y-shaped tunnel is constructed of large pieces of coke with the intersection of the legs at approximately the center of the cupola, and one leg leading to the kindling door.

Tunnel should be about 4 in. in diam, and after it is constructed the remainder of the bed is placed in position so that the tunnel is not disturbed. Oil-soaked waste or similar easily ignitable material is placed in the tunnel, lighted, the burner inserted and the gas ignited. In 15 to 30 minutes the coke should be well ignited. Then the burner is withdrawn, and the blower turned on for a few minutes to help things along. Kindling hole then is sealed with refractory brick and mud.

Other method is to ignite through the tuyeres. In this three alternate tuyeres are used, and tunnels are formed by placing 12-in. pieces of steel pipe about 4 in. in diam from the tuyere openings at a downward angle of about 30 with the horizontal. The coke bed then is put in, and the pipe withdrawn carefully so as not to disturb the coke. In this case it is preferable to use three burners inserted in the tuyere openings, although one burner can be used by shifting as soon as the coke becomes ignited.

Gas burners used should be capable of ejecting a flame about 12 to 14 in. long, and while they may be constructed from steel pipe, etc., we believe it is preferable to purchase one which is designed by the manufacturer to be safe in operation as well as for economy or efficiency in fuel consumption. Such burners or torches, as they more commonly are termed, may be obtained from a number of manufacturers in this country. At least one maker has developed a special burner which employs a combination of gaseous fuel, compressed air and oxygen to provide rapid ignition of the bed in the cupola.

Removes Gases With Nitrogen

Q.—We have been looking for some information on use of nitrogen in melting copper. Can you give us any references?

A.—By use of nitrogen in melting copper you presumably mean its application as a degasifier. While nitrogen is used considerably with aluminum alloys, we do not know whether it is being used to any great extent with copper or copper-base alloys. However, there have been numerous references in the literature to such application. For example, Baker and Child in England found that dry nitrogen gave good results in promoting soundness in copper-base alloys. However, the nitrogen drives off zinc and phosphorus, so where the loss of those elements is to be held to a minimum, the method is not suitable. Baer and Loring also found nitrogen degasification gave sound castings.

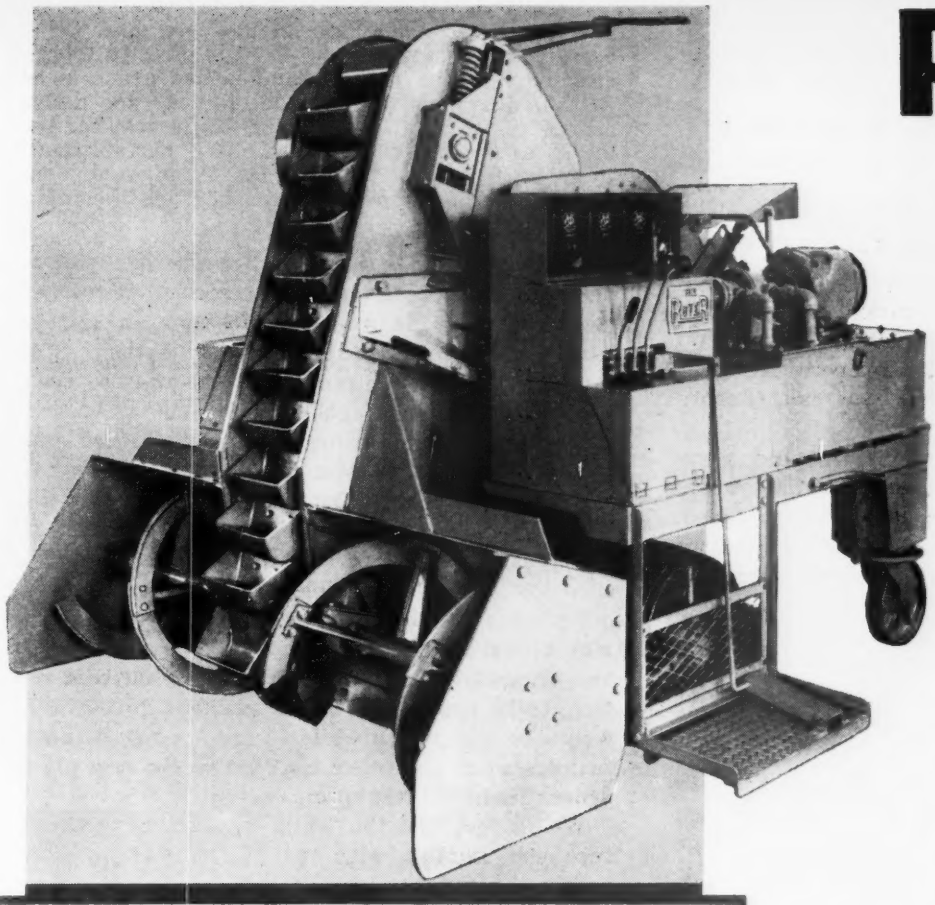
In the January, 1949 issue of FOUNDRY Kurzinski discusses the use of nitrogen in degasifying pure copper and states that the minimum amount is 8 cu ft per ton for best results, although some improvement can be obtained with lesser amounts. Method of introducing the gas is through a hollow graphite tube with a porous graphite plug at the end immersed in the molten metal. The porous plug permits dissemination of the gas in fine bubbles, and a fairly rapid rate of gas admission should be employed, but not so fast that metal is splashed from the crucible. Baker and Child suggest a rate of at least 0.3 to 0.35 cu ft per minute while Baer and Loring used 0.7 cu ft per minute.

Removing Risers From Bronze

Q.—We are in need of advice on how to cut off round risers 2 to 3 in. in diam on manganese bronze castings. We have tried hacksawing, torching, abrasive wheels, chiseling, etc.

A.—It is said that manganese bronze can be fractured comparatively easily when its temperature is in the "pink" range as indicated by the surface color. In high-tensile bronze this is said to be between 600 and 1000 F, while in the 60,000 psi type, the range

(*Concluded on page* 118)



ROYER *Sand Hog*

for completely mechanized sand preparation self-loading— self-propelled

SPECIFICATIONS

Overall Dimensions

Height—Operating	7'5"
Height—Traveling	8'11"
Width	7'
Length—Operating	8'
Length—Traveling	8'8"

Power

Total Horsepower	15 HP
Main Drive	5 HP
Bucket Line & Magnetic Pulley	5 HP
Royer Sand Separator	5 HP

Speed Range

Forward & Reverse Variable
0 to 15' per min. in low
65' to 85' per min. in high
Turning radius—5½'

Miscellaneous

24" diameter screw—7' wide.
Steel bucket line chain.
Flint rim bucket line sprockets.
Magnetic pulley—15" diameter
22" long
Net weight approx. 11,000 lbs.
Shipping weight approx. 11,300 lbs.

The new Royer SAND HOG eliminates the many costly hours of back-breaking labor ordinarily associated with sand conditioning...and at the same time supplies from 40 to 60 tons per hour of perfectly prepared sand, ready for the molders' use.

This one man operated, hydraulically powered machine moves into the sand heap, scoops up and completely conditions the sand and discharges it from the rear, free of all contamination. *Magnetic separation* removes all sizes of scrap, in many cases eliminating the need for riddling.

A further labor saving is made in doing away with costly sand handling and hauling . . . you can take the SAND HOG to the sand.

Extreme maneuverability is a feature of the SAND HOG . . . it can be turned in a 5½' radius, will travel over a 30" windrow of sand with the scraper and screw raised, operates in a wide range of speeds with instantaneous reversing.

Ask for further information on this newest labor saving equipment.

ROYER FOUNDRY & MACHINE CO.

159 PRINGLE ST., KINGSTON, PA.

QUESTIONS and Answers

(*Concluded from page* 116)

is 700 to 750°F. Presumably by "torching" you mean heating up to the brittle range, and possibly you did not get the risers hot enough. It would be advisable to use one of the temperature indicating marking materials so that you can be sure you are in the proper range.

Removing the risers with thin, high-speed abrasive cut-off wheels should function satisfactorily when the proper speeds and abrasive wheel are used. Band-sawing and circular sawing with suitable saws also might be employed. Usually with abrasive wheel, band and circular sawing, the cutting tool may be arranged to perform the operation in various planes—for example, with a tilting table or a tilting head on which the tool is located. Particular arrangement in general will depend upon size and weight of the casting.

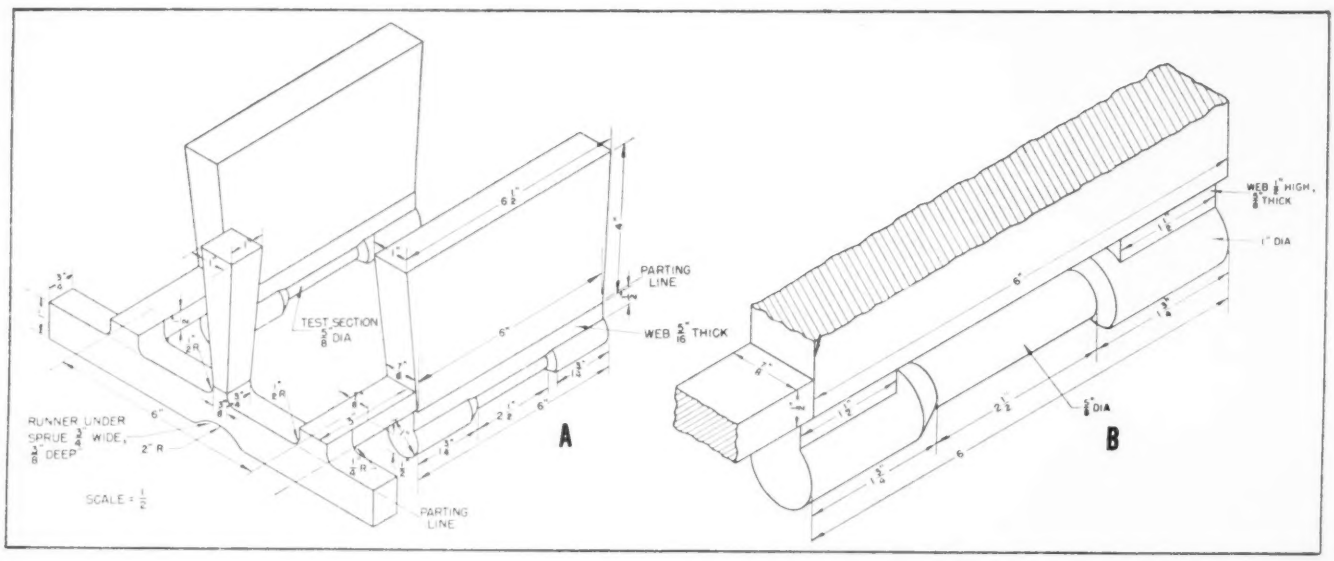
Another solution to your problem would be to use metal screens or cut-off cores in the future. Then the risers can be knocked off. Screens are 30 gage tinned, perforated steel sheets with a hundred 3/64-in.-diam holes per square inch. Pieces are cut out somewhat larger than the riser diameter and fastened to the cope with nails. Cut-off cores are made about an inch larger than the riser diameter. If made 3/16 to 1/4-in. thick with a 1/2-in. hole, they should serve.

Test Bar Fails on Inspection

Q.—We are having difficulty in making a test bar to pass inspection on a Navy contract. Material is 88-8-4 alloy to meet specification QQ-B-691, composition 6X with a minimum tensile strength of 30,000 psi and a minimum elongation of 12 per cent in 2 in. We have tried every possible way to gate the test bars, pouring at 2100 and 2200°F directly from the crucible into the mold. Sand is fine grade as used for aluminum and brass mold, and not too damp to cause chill although the fracture of the test bar seems to be of a chilled structure. We have attempted to make test bars 1⅛ and 1¼ in. in diam and 12 in. long, and machined to ½-in. in diam in center for testing.

A.—It is not quite clear to us whether you have been unsuccessful in making a satisfactory test specimen according to the specifications in QQ-B-691 which refers to Figs 10 or 10A in Federal Specification QQ-M-151—known more commonly as the full web and grip web Webbert bars, as shown in the accompanying illustration—and have turned to the 1⅛ and 1¼-in. bars you mention, or are not aware of the previously mentioned procedure. If you have not tried making the test specimens as indicated in the sketch, we suggest that you do so, and we are sure that you will be able to meet the physical requirements provided you melt properly. Possibly you may obtain the best combination of tensile strength and elongation by pouring at 2050°F, but that would have to be ascertained by experiment. In any case it would be well worth while to try a range of pouring temperatures, and select that giving the best physical properties in the test specimen.

We suspect that the "chill" appearance of the fracture you mention with the 1⅛ and 1¼-in. bars is rather the opposite, resulting from slow cooling and lack of feed. The heavy machining required to reduce the bars to the ½-in. test section brings the poorest portion, the center, of the bar under test, unless the gating and risering is such as to provide positive and adequate feeding. The only way one can be sure is to make the bars by the "keel-block" method whereby the specimen section at the bottom is fed directly without any constricted passage by an extremely heavy riser above. As Roast points out, a considerable quantity of metal is required to provide a suitable bar, and mentions 30 to 40 lb for a resulting bar 1½ x 1¾ x 6 in.

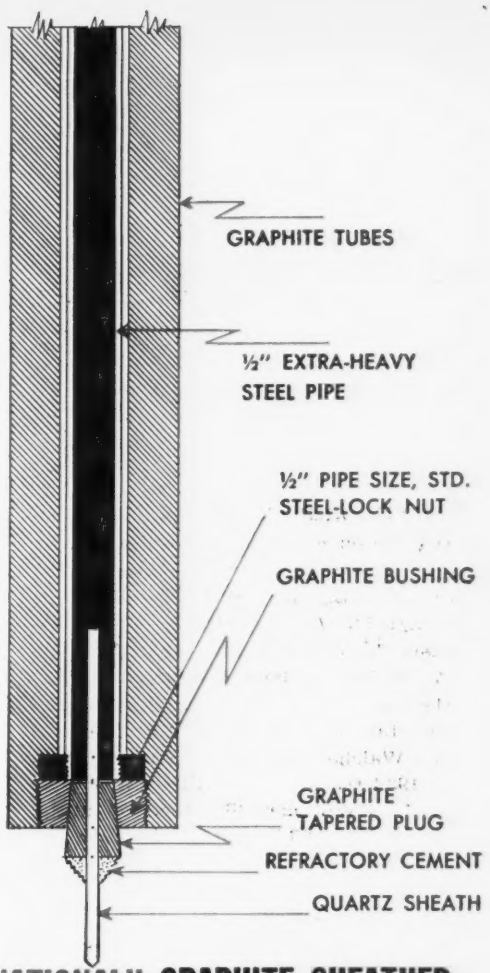


(a) Gating design for the double vertical full-web (being cast) or grip-web type bars. (b) Design of the vertical grip-web type bar

In Furnace and Foundry...

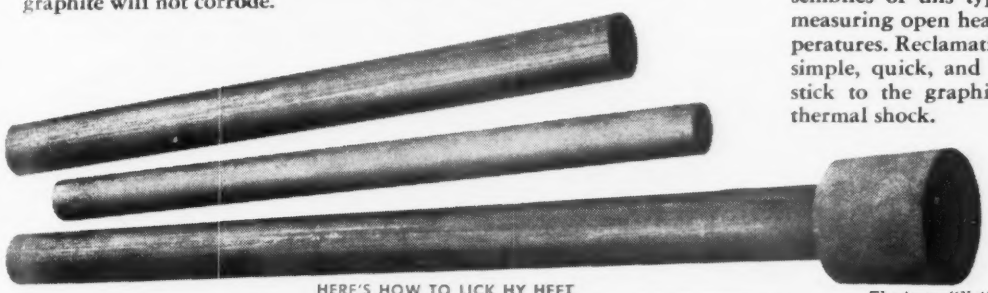
These SMALL PARTS do a BIG JOB

● High temperature applications of "National" Carbon and Graphite are not limited to big-tonnage items. A part of National Carbon's service is to develop *any* application, however small, where the unique properties of carbon and graphite assure a convenience and economy to the user. In the following two instances, a few *pounds* of graphite serve literally *tons* of metal . . . efficiently and at a saving.



"NATIONAL" GRAPHITE FLUXING TUBES

Can't be equalled by any other material for the introduction of purifying gases into molten metal. Graphite won't melt in the bath, can't contaminate the metal. Its low coefficient of expansion prevents cracking and spalling. Metal and dross do not adhere tightly to it. And whatever gases are used, graphite will not corrode.



"NATIONAL" GRAPHITE-SHEATHED THERMOCOUPLE ASSEMBLY (Typical)

Only graphite could provide the degree of low-cost, trouble-free protection required by thermocouple assemblies of this type for the immersion method of measuring open hearth and electric furnace bath temperatures. Reclamation and maintenance for re-use are simple, quick, and economical. Molten metal won't stick to the graphite parts and they're immune to thermal shock.

HERE'S HOW TO LICK HY HEET

National Carbon Company
30 E. 42nd Street
New York, N. Y.

PLEASE SEND INFORMATION ON:

☐ Thermocouple Sheath Parts ☐ Fluxing Tubes

NAME_____

COMPANY_____

ADDRESS_____

The terms "National" and "Eveready" are registered trade-marks of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, New York
District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco
IN CANADA: National Carbon Limited
Montreal, Toronto, Winnipeg

LOW LIGHT BILLS . . .

. . . mark phenomenal acceptance of "EVEREADY" No. 1050 Industrial Flashlight Batteries by a broad cross-section of industry. Delivering twice the usable light of any battery we've ever made before, it will not swell, stick or jam in the flashlight . . . has no metal can to leak or corrode.

BLAST FURNACE LININGS • BRICK • CINDER NOTCH LINERS • CINDER NOTCH PLUGS • SKIMMER BLOCKS • SPLASH PLATES • RUNOUT TROUGH LINERS • MOLD PLUGS • TANK HEATERS

MEN of Industry

WILLARD P. DUDLEY has been elected vice president in charge of production, the Ohio Steel Foundry Co., at its Lima and Springfield, O., plants, succeeding **Edwin A. Walcher** who has retired. Mr. Dudley has been associated with the company since 1930 and has been secretary-treasurer since May 1945. Mr. Walcher went with the company in 1938 from American Steel Foundries, Chicago, and had been in the production post since that time. **John L. Crouse** has succeeded Mr. Dudley as secretary-treasurer.

♦ ♦ ♦

J. Allan Wickett has been named chief metallurgist, Brillion Iron Works Inc., Brillion, Wis. Following graduation from University of Toronto in 1939 Mr. Wickett was an apprentice engineer in the Toronto, Ont., and Shawinigan plants of Aluminum Co. of Canada Ltd., Quebec. Following military service he returned to the Steel Co. of Canada Ltd., and in 1947 joined Interlake Chemical Corp., Cleveland. When the latter was acquired by Monsanto Chemical Co., Springfield, Mass., in 1949, he continued to work on resin corebinders and shell molding.

♦ ♦ ♦

Elmer R. Ransom has been elected vice president, Richards-Wilcox Mfg. Co., Aurora, Ill. Mr. Ransom joined the company in 1936, became assistant district manager of the Cleveland branch, and in 1948 returned to the Aurora office as manager of the Conveyor Division. He will continue as manager of the R-W OveR-Way Division.

♦ ♦ ♦

Lester A. Shea has been granted leave of absence as general sales manager, Lindberg Engineering Co., Chicago, to serve as chief of the industrial heating equipment section, Metalworking Equipment Division of the National Production Authority, Washington. Mr. Shea received his engineering and business management education at University of Wisconsin's school of engineering and its Milwaukee branch. He held various positions in design engineering furnace field erection and district office management prior to joining Lindberg Engineering Co. in 1937.

♦ ♦ ♦

H. M. Oshry has been named vice president and a director, Crawfordsville Foundry Co., Crawfordsville, Ind. Mr. Oshry was graduated from Massachusetts Institute of Technology and was metallurgist at U. S. Steel Corp., Kearney, N. J., and also at P. R. Mallory Co., Indianapolis, until Army service in World War II. From 1945-1948 he was works manager, F. H. Langsenkamp Co., Indianapolis, and had his own consulting company there until 1950 when he joined Crawfordsville Foundry.

♦ ♦ ♦

Eugene F. Eckerle, vice president and a director of Aluminum Industries Inc., Cincinnati, has been appointed general manager. **Richard G. Tessendorf,** sales manager, original equipment division, has been named assistant general manager in charge of manufacturing. **John H. Hater** succeeds Mr. Eckerle as secretary.

♦ ♦ ♦

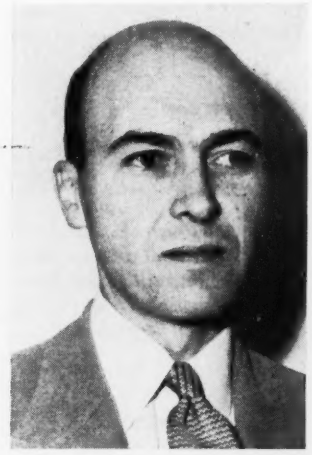
R. S. Stevenson has been elected executive vice president, Allis-Chalmers Mfg. Co., Milwaukee. **Willis G. School,** formerly vice president-general sales manager of the Tractor Division, succeeds Mr. Stevenson as vice president in charge of that division. **Frank Mussell,** formerly eastern territory manager of the Tractor Division becomes vice president-general sales manager.

♦ ♦ ♦

P. M. Buhrer and **C. O. Kleinsmith** have been appointed executive vice presidents of National Carbon Co., Division of Union Carbide & Carbon Corp. Mr. Buhrer was previously assistant general manager of National Carbon Co. in New York and is a vice president-director of National Carbon

(Continued on page 122)

WILLARD P. DUDLEY
. . . v. p., Ohio Steel



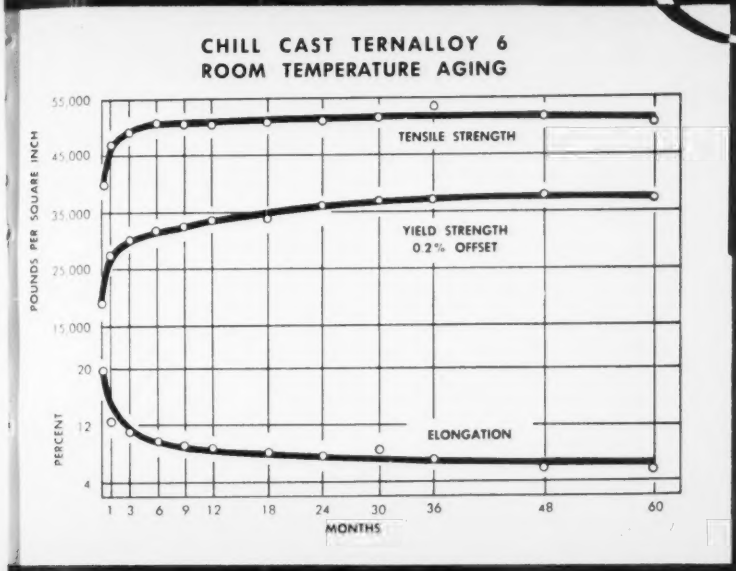
J. ALLAN WICKETT
. . . joins Brillion Iron

ELMER R. RANSOM
. . . Richards-Wilcox v. p.

LESTER A. SHEA
. . . NPA executive

Ternalloy

ALUMINUM ALLOYS



"TERNALLOY" is the name of a series of aluminum base alloys in which the principal alloying constituent is the ternary compound $Al_2Mg_3Zn_3$. This compound is a precipitation hardening agent of considerable power, and when small amounts of other carefully proportioned alloying elements are added these alloys will develop very unusual properties. They are characterized by their natural age hardening at room temperature and will give desirable combinations of mechanical properties in the range of heat treated aluminum alloys without the necessity or expense of heat treatment.

There are four Ternalloys: 5, 6, 7, 8. Slight composition variations alter the mechanical properties from high tensile strength with high elongation to higher tensile strength with moderate elongation. The selection of a particular alloy is predicated on the casting requirements and the foundry process: sand, permanent mold, plaster, or die casting.

WRITE FOR FOLDER! Address: Apex Smelting Company, Dept. T, 2537 W. Taylor St., Chicago 12, Illinois

APEX SMELTING COMPANY

(*Continued from page* 120)

Ltd. Mr. Kleinsmith has been a vice president of National Carbon Co. since 1944.

♦ ♦ ♦

Richard N. Benson, Peter D. O'Neill and **Stephen P. Terlecky** have been appointed field engineers, Republic Rubber Division, Lee Rubber & Tire Corp., Youngstown, O., following a period of sales training. Mr. Benson, a graduate of Kent State University, and Mr. O'Neill, of Youngstown College, have been assigned to the Chicago district office. Mr. Terlecky, also a graduate of Youngstown College, has been sent to the Philadelphia district office.

♦ ♦ ♦

Russell B. Jenner has been named New England sales service representative for the Richard C. Remmey Son Co., Philadelphia, maker of clay and silicon carbide refractories. Mr. Jenner was formerly manager of the special refractories division, Harbison-Walker Refractories Co., Pittsburgh.

♦ ♦ ♦

Harry K. Sleicher has been appointed general manager, Seaboard Foundry Inc., Providence, R. I., in addition to his position as vice president. **Thomas G. Healey,** formerly general superintendent, has been named foundry manager. **Bradford J. La Chappelle,** who has been assistant superintendent, has been appointed superintendent.

♦ ♦ ♦

Odd H. McCleary, vice president-general manager, Mathews Conveyer Co., Ellwood City, Pa., has been elected vice president of its Canadian subsidiary, Mathews Conveyer Co. Ltd., Port Hope, Ont. **Chesley A. Paul,** formerly purchasing agent in Ellwood City, has been elected vice president-purchasing and **Lee Sekulski,** sales manager, has been named a director of the company. **L. J. Johnson,** formerly field engineer with offices in New York, has been appointed assistant sales manager in the home office. **Arnold Richter** has replaced Mr. Johnson in New York. He was previously with the engineering group in Ellwood City.

♦ ♦ ♦

Roy W. Bennett recently joined Walter Gerlinger Inc., Milwaukee, foundry equipment representative and engineering service, where he will be in charge of the Foundry Materials Division. Since 1947 Mr. Bennett has been associated with Hydro-Blast Corp., Chicago. He was previously with Metro-Nite Co., Milwaukee, Harry W. Dietert Co., Detroit, and American Steel Foundries, Chicago.

♦ ♦ ♦

Sir William Griffiths, London, England, has been named consultant for Lebanon Steel Foundry, Lebanon, Pa. Sir William until recently was chairman and managing director of Mond Nickel Co., England, and vice chairman-director, International Nickel Co. of Canada. He is now associated with a number of companies on both sides of the Atlantic.

♦ ♦ ♦

Lionel Y. Greene, since 1936 vice president, General Refractories Co., Philadelphia, has been elected president. **Floyd L. Greene,** who has been president of the company since 1937, has become chairman of the board and will remain senior executive officer. Lionel Greene joined General Refractories in 1923, and has been executive vice president since 1948.

♦ ♦ ♦

George A. Zink, recently appointed assistant general manager of the Fabricast Division of General Motors in Bedford, Ind., has been named general manager, succeeding **C. M. Jessup,** who has retired. Following graduation from Purdue University in 1929, Mr. Zink joined the Allison Division of GMC where he become assistant general manager in 1943. He was works manager of the Detroit Diesel Engine Division until he went to Bedford last March. Mr. Jessup joined the company in 1920, was assistant general manager of the Allison Division and director of Bedford foundry operations, becoming general manager of Fabricast when it was formed in 1950.

♦ ♦ ♦

Gustav Laub, vice president in charge of sales, Vanadium Corp. of America, has been elected a director of the company. This announcement, as published in July FOUNDRY, erroneously referred to his retirement; it should have stated that Ward A. Miller had retired as a director.

♦ ♦ ♦

Dr. Frank A. Crossley has been appointed associate metallurgist, Armour Research Foundation of Illinois Institute of Technology, Chicago. Dr. Crossley for the past two years has been head of the department of foundry engineering, Tennessee A. & I. University. Prior to that he was a metallurgy instructor at Illinois Institute of Technology from which he was graduated.

♦ ♦ ♦

Charles P. Loucks has been appointed production manager of the Eastern Clay Products Department of International Minerals & Chemical Corp.'s Industrial Minerals Division. **John D. McKenzie** has been made assistant to Norman J. Dunbeck, vice president of the division. Mr. Loucks, a graduate of Massachusetts Institute of Technology, joined Eastern Clay Products in 1946 and was the company's field engineer to the foundry industry. In 1951 he became assistant to the general manager. Mr. McKenzie was graduated

(*Continued on page* 125)

RICHARD N. BENSON
. . . *Republic Rubber Sales*

PETER D. O'NEILL
. . . *Rubber sales, Chicago*

STEPHEN P. TERLECKY
. . . *Rubber sales, Philadelphia*

RUSSELL B. JENNER
. . . *joins Richard C. Remmey*

YOU NEED THE BEST CORE WASH

Buy MEXADIP™

- **MEXADIP WILL NOT FERMENT.** You will not have to dump your wash because of hot humid conditions — no pock marks or pitted coating surfaces with MEXADIP.

- **MEXADIP STAYS IN SUSPENSION.** Let it stand over the week end, it will be ready to go Monday morning.

- **MEXADIP WILL NOT RUN, BUILD UP OR RUB OFF.** It applies equally well on either green or baked cores.

- **MEXADIP IS DEPENDABLE AT ANY BAUME.** It is applied daily to cores for thousands of tons of castings over a range of 10-40 degrees Baume.

- **MEXADIP REQUIRES NO LONG "PASTE" MIXING.** No waiting period is necessary. Just add the powder to water and after a few minutes of stirring it is ready to go.

IMPROVE CASTING APPEARANCE AND SAVE MAN HOURS IN THE CLEANING ROOM. If you have a problem with core wash, MEXADIP will solve it. Ask us to arrange a test today.

Why wait . . .
Start now — Use MEXADIP™

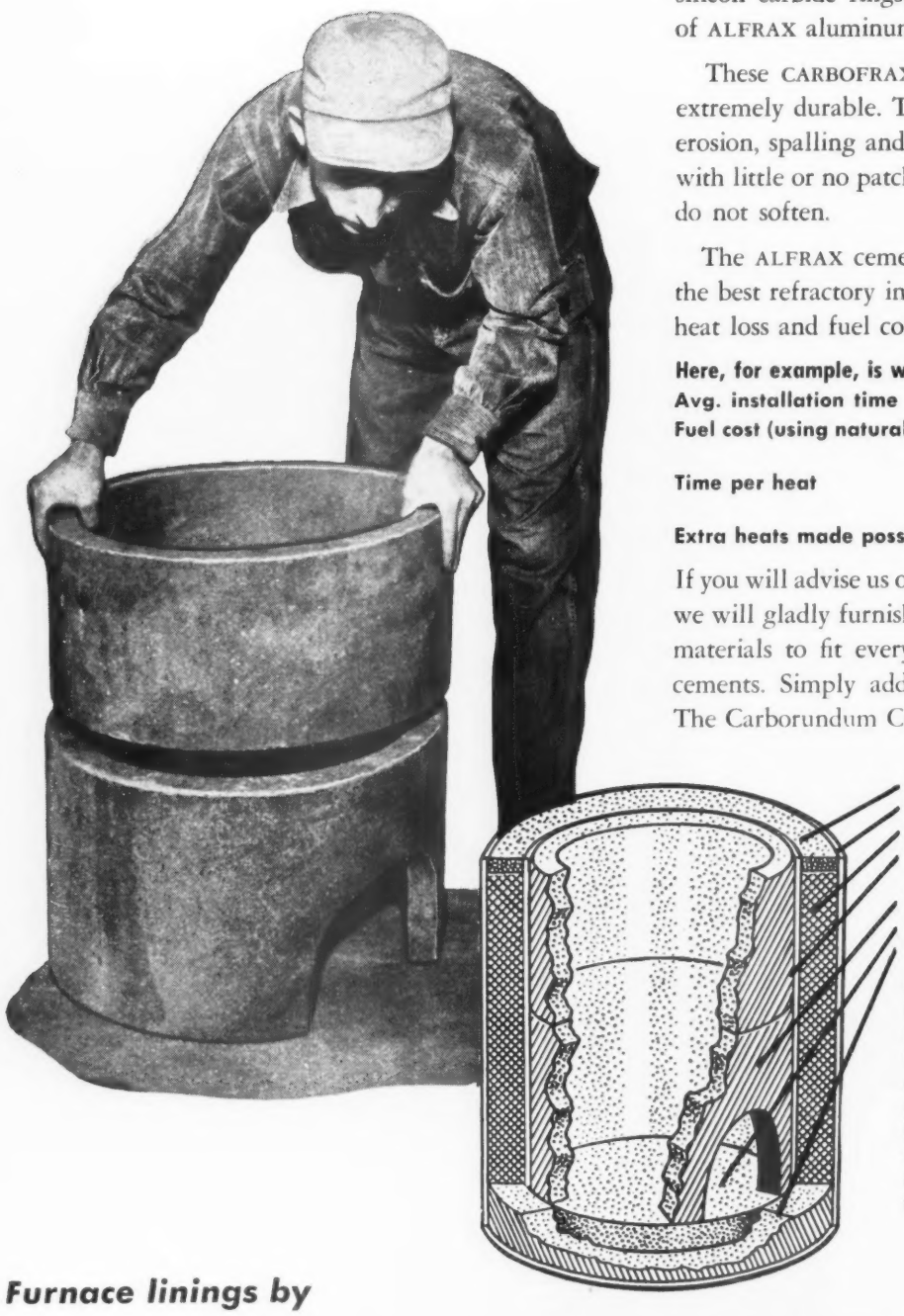
168

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

this ring/cement lining

goes in faster . . . stays in shape longer



Here's a lining for non-ferrous furnaces that can be installed in a couple of hours over a week-end, and be ready to go on Monday. It consists of one-piece CARBOFRAX silicon carbide rings, 1½" thick, backed up with 2½" of ALFRAX aluminum oxide cement.

These CARBOFRAX rings are exceptionally dense, and extremely durable. They are inherently resistant to flame erosion, spalling and cracking, and will go many months with little or no patching. Even at high temperatures, they do not soften.

The ALFRAX cement that backs up the rings is one of the best refractory insulating materials available. It keeps heat loss and fuel consumption to a minimum.

Here, for example, is what one foundry reports on these linings.

Avg. installation time	**— 2 hrs. per lining**
Fuel cost (using natural gas)	**— $.0015 per lb of manganese bronze melted**
Time per heat	**— 40 min. (moreover, it's now a *consistent* 40 min.)**
Extra heats made possible	**— 1 per day, 2 if necessary**

If you will advise us of your particular operating conditions we will gladly furnish recommendations. We make lining materials to fit every need — rings, ring segments, and cements. Simply address Dept. A-82, Refractories Div., The Carborundum Co., Perth Amboy, N. J.

"CARBOFRAX" CEMENT #30
FURNACE SHELL
"ALFRAX" CEMENT #27
CARDBOARD OR SHEET ASBESTOS SEPARATOR
"CARBOFRAX" LINING
"CARBOFRAX" CEMENT #30
FIRECLAY

Here's a typical ring/cement lining. The CARBOFRAX ring lining is only 1½" thick — hence, there's more space for insulation, better protection against heat loss. • Castable ALFRAX cement #27 is used to back up the rings. (It's easy to install — just mix with water and handle like Portland cement.) • CARBOFRAX cement #30 is rammed in the bottom and is used to top off the ALFRAX lining. It's highly resistant to abrasion.

Furnace linings by

CARBORUNDUM

Trade Mark

for lower cost installation . . . operation . . . maintenance

"Carborundum", "Alfrax", and "Carbofrax" are registered trademarks which indicate manufacture by The Carborundum Company.

JOHN A. GOODWIN
. . . *Morrison gen. mgr.*

JAMES K. GILLAM
. . . *FOUNDRY sales, Ohio*

NED W. TAYLOR
. . . *Taylor Chain sales*

WILLIAM N. DAVIS
. . . *heads AFS program*

(*Continued from page* 122)

from Purdue University and obtained his master's degree from University of Pennsylvania. He became associated with International Minerals in 1950 and was previously a technical economist and assistant to the vice president of its research division.

♦ ♦ ♦

John A. Goodwin has been appointed general manager, Morrison Engineering Corp., Cleveland, manufacturer of industrial ovens, furnaces, bakers and finishing systems. Mr. Goodwin was graduated from Case Institute of Technology and for the last 15 years has been with Chase Brass & Copper Corp., Waterbury, Conn., where he was products and research engineer, sales promotion engineer and chief metallurgist. Prior to that for 6 years he was field engineer with North American Mfg. Co., Cleveland.

♦ ♦ ♦

James K. Gillam has been appointed district manager of FOUNDRY in the Ohio territory where he will be associated with A. L. Klingeman, regional manager. Mr. Gillam attended DePauw University and Cleveland College and was previously district manager in Cleveland for Jenkins Publications Inc., and assistant publisher, Huebner Publications there.

♦ ♦ ♦

Ned W. Taylor has been appointed West coast representative, S. G. Taylor Chain Co., Hammond, Ind., with headquarters in Los Angeles. Mr. Taylor, whose great grandfather founded the company, was graduated from University of New Mexico. For the last five years he has been associated with Union Oil Co. of California.

♦ ♦ ♦

William N. Davis has been appointed director of the Safety & Hygiene & Air Pollution Program, American Foundrymen's Society, succeeding **Kenneth M. Morse** who in March joined the industrial hygiene staff, U. S. Steel Corp., Pittsburgh. Mr. Davis was graduated from Massachusetts Nautical School and later did postgraduate work at Wayne University. For the past 4 years he has been a senior engineer with National Safety Council, Chicago, as consultant to the foundry and other metals industries on industrial safety practices.

♦ ♦ ♦

George Uhle Sr. and **George Uhle Jr.,** manufacturers agents, Cleveland, have been appointed representatives in that area for American Foundries Co., Milan, Mich., division of Maumee Malleable Castings Co., Toledo, O., alloy and gray iron castings. They also represent Taylor & Boggis Foundry Co., production gray iron castings, and Mohawk Foundries Inc., aluminum castings, Cleveland. The elder Uhle for over 20 years was identified with major league baseball, ten years of that time with the Cleveland pitching staff.

♦ ♦ ♦

F. H. Allison Jr. has been appointed assistant vice president, Blaw-Knox Co., Pittsburgh, in charge of metallurgy and roll sales. He will be responsible for integrating sales and servicing functions of Pittsburgh Rolls and Lewis Rolls Divisions as well as directing metallurgy in the company's Pittsburgh foundries. Dr. Allison had been associated with United Engineering & Foundry Co., Pittsburgh, since 1934, and for the last 8 years was chief metallurgist there.

♦ ♦ ♦

Howard S. Bunn, formerly vice president, has been appointed president, Bakelite Co., division of Union Carbide & Carbon Corp., New York. Mr. Bunn was graduated from Lehigh University and joined the company in 1922 as an alloy specialties salesman. After managing various divisions, in 1944 he became vice president of the Plastics Division and vice president-sales, Thermoplastics Division of Bakelite Co.

♦ ♦ ♦

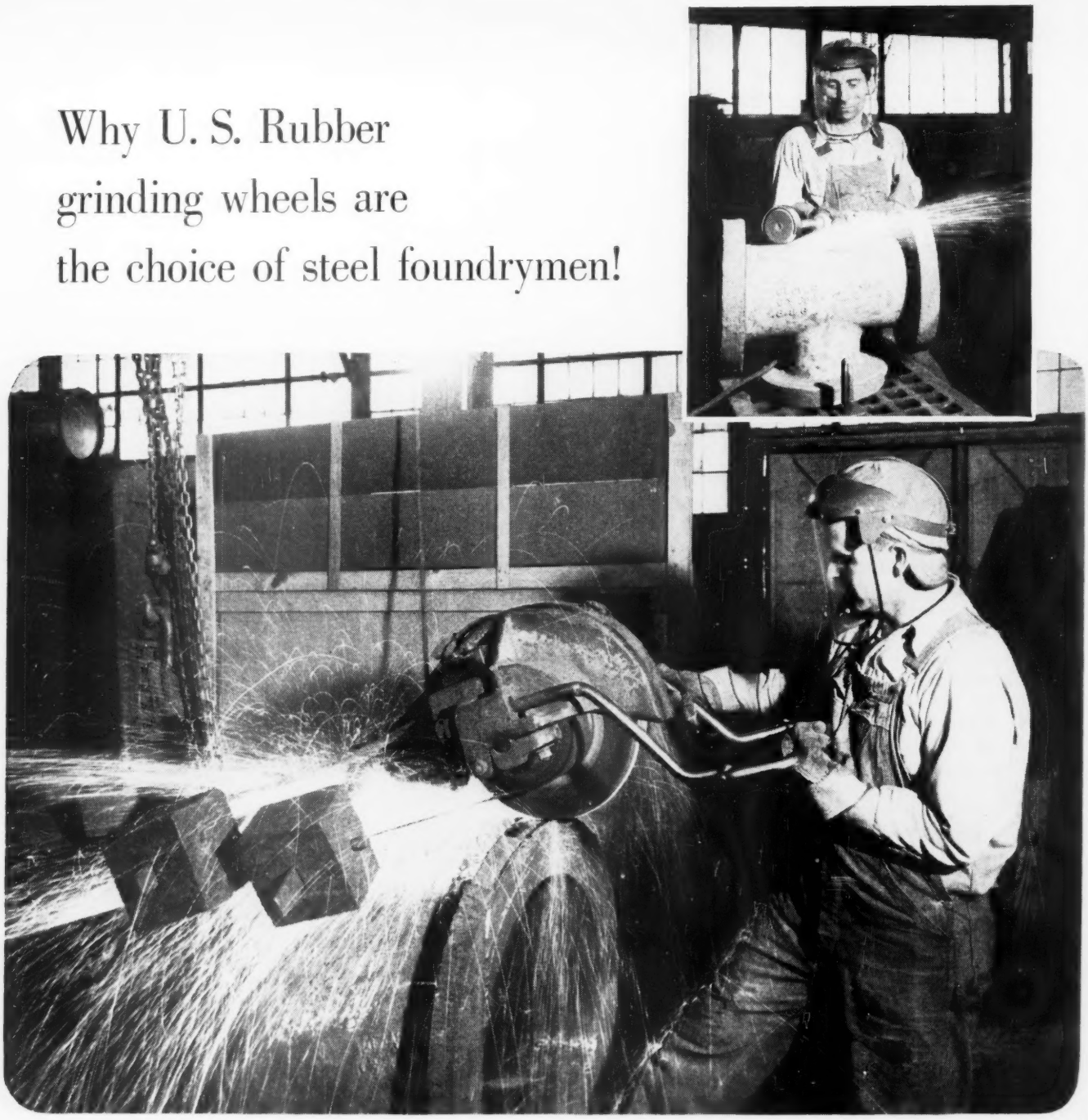
Wallace L. Howe, formerly director of development, Norton Co., Worcester, Mass., has been appointed di-

(*Concluded on page* 127)

GEORGE UHLE SR.
. . . *American Foundries sales*

F. H. ALLISON JR.
. . . *Blaw Knox executive*

Why U. S. Rubber grinding wheels are the choice of steel foundrymen!



Small photo at top shows worker grinding large "T" used in refineries. Large photo shows worker smoothing casting of elbow.

A foundry in Georgia, casting steel pipe fittings, removes gates and flash, grinds openings and bolt holes—using U.S. Royalite® Grinding Wheels exclusively. Why? Because they have proven to be the most efficient and economical. They are fast-cutting and remain cool in operation.

Over 89 years of experience with bonds and abrasives enable United States Rubber Company to lick most any grinding wheel problem you may have. Write to address below.

GRINDING WHEEL INSTITUTE MEMBER

PRODUCTS OF

U.S.RUBBER

SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

(*Concluded from page* 125)

rector of research and development, following the resignation of **Dr. Samuel S. Kistler,** director of research. Mr. Howe joined the company in 1923, following graduation from Massachusetts Institute of Technology, as a research engineer, later becoming director of product engineering.

♦ ♦ ♦

James A. Hayes has joined the Cleveland organization of American Wheelabrator & Equipment Corp., Mishawaka, Ind., as district sales engineer. Mr. Hays was graduated from Massachusetts Institute of Technology and has been engaged in industrial and sales engineering for several years. He recently completed a period of training at the Mishawaka plant of American Wheelabrator.

♦ ♦ ♦

M. E. Ziegenhagen has been appointed advertising and sales promotion manager, Worthington Corp., Harrison, N. J. Since graduating from University of North Dakota in 1937, Mr. Ziegenhagen has been associated with General Electric Corp. in promotion and sales work at Pittsfield, Mass., and Schenectady.

♦ ♦ ♦

Charles C. Reiff has been named chief engineer of the Barberton, O., Division, Rockwell Mfg. Co., Pittsburgh, where he will be responsible for the engineering and manufacture of Nordstrom valves. Mr. Reiff, who was graduated from Drexel Institute of Technology, joined the company in 1950 as a design engineer. Previously he was associated in that capacity with Heintz Mfg. Co. and Franklin Institute Laboratories for Research & Development, both of Philadelphia.

♦ ♦ ♦

Thurman J. Brown, since 1927 special sales representative, Federal Foundry Supply Co., Cleveland, is observing his 50th anniversary in the foundry industry. He served four years of apprenticeship with Logansport Foundry Co., Logansport, Ind., American Car & Foundry Co., Sinker & Davis Engine Co. and Atlas Engine Co., Indianapolis. From 1906-1911 he was associated with Anderson Engine Co., Muncie Foundry & Machine Co., and Wabash Foundry Co. He returned to Logansport, where he was with Ruteubune Motor Co., as foreman and superintendent for 7 years, and following a year at American Foundry Co. as coreroom superintendent, he spent 7 years with Velie Motor Co. and Marion Foundry Corp., and 3 years with Frank Foundry Corp., as superintendent.

♦ ♦ ♦

John R. Boudreau; sales engineer, Bay State Abrasive Products Co., Westboro, Mass., has been appointed abrasive engineer in the Dallas, Tex., office. Other promotions from the home office sales engineer staff to abrasive engineers include: **Robert A. Green,** Worcester Polytechnic Institute graduate, to the Detroit office; **Russell L. King,** Worcester Polytechnic Institute graduate, to Chicago; and **John R. Mele,** Cornell University graduate, to Toledo, O.

♦ ♦ ♦

Robert M. Woodside has been appointed Cleveland branch manager, Industrial Division, Minneapolis-Honeywell Regulator Co., Philadelphia. **John O. Paul** has been assigned as Los Angeles branch manager and **Lee Aplin** will manage the San Francisco office. The men recently completed the company's instrumentation course in Philadelphia.

♦ ♦ ♦

Loring F. Coes Jr. has been named assistant director of research and development, Norton Co., Worcester, Mass., in charge of the laboratory's organic section. **Albert A. Klein** has become assistant director of research and development in charge of microscopic, chemical and physical research sections. They will serve under Wallace L. Howe, recently named director of research and development.

♦ ♦ ♦

Walter Sokolosky has been named foundry service engineer, Plastics Division, Monsanto Chemical Co., Springfield, Mass., where he will assist foundries in developing application of the shell molding process. Mr. Sokolosky was graduated from Norwich University and attended Massachusetts Institute of Technology for one year. He was formerly associated with Saco-Lowell Shops, Biddeford, Me., and Warren Pipe & Foundry Corp., Phillipsburg, N. J.

♦ ♦ ♦

Robert C. Carruthers, formerly sales development engineer, American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill., has been named assistant sales manager of welding products for the division. Mr. Carruthers was graduated from Massachusetts Institute of Technology and joined the company two years ago.

♦ ♦ ♦

John H. Johnson, assistant purchasing agent, Crompton & Knowles Loom Works, Worcester, Mass., has been named purchasing agent, succeeding **Frank E. Colesworthy,** who has retired after 53 years of service.

♦ ♦ ♦

Adrian Archambault has been appointed Michigan representative, with headquarters in Muskegon, for Indiana Products Co., Kokomo, Ind., succeeding **Kenneth Clark,** who has resigned from the fire brick and foundry supplies company. Mr. Archambault spent 9 years with Grede Foundries Inc., Milwaukee, and more recently was in charge of the foundry department, Hackley Manual Training School, Muskegon.

JAMES A. HAYES
. . . *Wheelabrator sales*

M. E. ZIEGENHAGEN
. . . *Worthington sales*

CHARLES C. REIFF
. . *chief engineer, Rockwell*

THURMAN J. BROWN
. . . *foundry industry veteran*

Malleable Founders' Meeting

Emphasizes Research, Market Development

GEORGE T. BOLI
Vice President

FRANK D. BRISSE
President

By FRANK G. STEINEBACH
Editor
FOUNDRY

ANNUAL meeting of the Malleable Founders' Society, held at the Homestead, Hot Springs, Va., June 16-17, featured reports on the many ramifications of society activities, with special emphasis on research and market development. During the meeting two recently completed research reports were issued to the membership.

Frank D. Brisse, president, Laconia Malleable Iron Co., Laconia, N. H., was elected president of the society, succeeding Cal C. Chambers, president and general manager, Texas Foundries Inc., Lufkin, Tex. George T. Boli, president, Northern Malleable Iron Co., St. Paul, was named vice president. New directors for three years are: Charles E. Brust, executive vice president, Eastern Malleable Iron Co., Naugatuck, Conn.; Clarence I. DeShong, president, Oriskany Malleable Iron Co., Oriskany, N. Y.; Ross L. Gilmore, president and general manager, Superior Steel & Malleable Castings Co., Benton Harbor, Mich.; Carl F. LaMarche, president and treasurer, American Malleable Iron Co., Marion, O. Ralph N. Cole, president Canton Malleable Iron Co., Canton, O., was elected to the board to fill a one-year vacancy.

The annual banquet featured the presentation of the 1952 Charles H. McCrea award to Ralph N. Cole, president, Canton Malleable Iron Co., Canton, O., for his many outstanding contributions to the society and the malleable iron industry.

In opening the first session, Cal C. Chambers called attention to a folder entitled "Annual Report to the Shareholders of the Malleable Founders' Society," for the fiscal year June 1, 1951 to May 31, 1952. This report, prepared by the managing director of the society and distributed at the meeting, carried a message from Mr. Chambers, the retiring president, and thumbnail sketches of assets (accomplishments) and liabilities (deferred obligations). The light-colored background revealed some of the society publicity on malleable iron during the past year, including a reproduction of the October, 1951 cover of FOUNDRY, which marked the 125th anniversary celebration of the manufacture of malleable iron in the United States.

Mr. Chambers commented on the long-range research program now under way, and paid special tribute to the contributions of Leon J. Wise, W. A. Kennedy and James H. Lansing to this work. He also praised the Market Development Conference held at Case Institute, and commented on the overall activities of the Market Development Committee. Other committee activities were discussed briefly. In conclusion, Mr. Chambers pointed to the need of a more aggressive program in hiring and training engineers in the foundry industry.

John A. Wagner, Wagner Malleable Iron Co., Decatur, Ill., in reporting for the Cost Committee, stated two new projects were undertaken during the past year. The committee assisted the Industry Task Force in the development of the final OPS price regulation for the industry. As a further service to the industry, three special meetings were held to

(*Continued on page* 130)

Ralph N. Cole (right), president, Canton Malleable Iron Co., Canton, O., is presented the McCrea medal by Wilson H. Moriarty, vice president, National Malleable & Steel Castings Co., at the Malleable Founders' meeting. Award honors the memory of Charles H. McCrea, former National Malleable president

Design Engineers Agree:

Close valve coupling makes for greatest pneumatic efficiency

And The Bellows Air Motor

Is the only Air Cylinder with a Built-in Valve

In pneumatics operation the more remote the valve from the cylinder the greater the possibility of erratic cylinder performance. In the Bellows Air Motor the valve is integral with the cylinder. This integral construction means *instant* action. No lag, no time delay, no air flow restriction. Integral construction means *positive control.* Directional control . . . speed control. Integral construction means *compactness.* Space saving design . . . simplified installation in cramped quarters, or on moving machine elements.

Bellows Air Motors are made in five bore sizes: 1¼", 1¾", 2½", 3⅝" and 4½". Any stroke length. They are available with either the built-in Bellows manually operated valve, or the Bellows Electroaire Valve*, a low-voltage electrically controlled air operated valve hardly bigger than a package of cigarettes, yet guaranteed for life against solenoid burnout.

For instant action, positive control, and compactness in pneumatic circuits, there is only one answer: The Bellows Air Motor — the air cylinder with the built-in valve.

* T.M. Reg. Pat. Pending

Let us send you

THESE FREE BOOKLETS

Complete technical data on the Bellows Air Motor and the Electroaire Valve. Address: The Bellows Co., Dept. F852, Akron 9, Ohio

The Bellows Co.

AKRON 9, OHIO

13-7

Field engineering offices in all principal cities of the United States and Canada.

Ralph N. Cole Winner of McCrea Medal

Ralph N. Cole, president, Canton Mallable Iron Co., Canton, O., was honored during the annual meeting of the Malleable Founders' Society by receipt of the 1952 McCrea medal, which is awarded annually for outstanding service to the malleable castings industry. Mr. Cole was graduated from Baltimore City College in 1907 and has been associated with the malleable castings industry since joining the Canton Malleable Iron Co. in 1921 as secretary. He has been president of that company since 1926. A past president of the society, Mr. Cole's service to the organization extends back to 1934 when he was a member of its first board of directors. He also has been chairman of the Cost Committee. Representing the industry numerous times in connection with government activities, Mr. Cole served as a member of the industry code authority during NRA days, was a member of the OPA industry committee during World War II and has served as a consultant to OPS.

RALPH N. COLE

(*Continued from page* 128)

explain the general provisions of the price regulation.

The committee also has developed a method for normalizing non-variable expenses, which will be incorporated as a supplement to the "Manual of Principles and Procedures of Cost Accounting." The committee has continued to advocate the use of the manual throughout the industry, and to that end, 23 accounting meetings were held during the year.

Charles A. Gutenkunst Jr., Milwaukee Malleable & Grey Iron Works, outlined the activities of the Economic Stabilization Committee, which had to do with the work of establishing price control. In reporting on the Committee on Government Affairs, C. M. Lewis, Badger Malleable & Mfg. Co., South Milwaukee, Wis., stated the committee would follow up the effort of the managing director to get the Munitions Board to adopt the ASTM specifications for malleable iron as a substitute for the federal specifications now in use.

Roy C. Hobson, National Malleable & Steel Castings Co., Cleveland, outlined the rather extensive activities of the Market Development Committee. During the year publicity on the moving picture "This Moving World," resulted in 495 showings of the society's films to 41,700 people. Last fall the committee promoted the 125th anniversary celebration of malleable iron. "Malleable Iron Facts" has been published throughout the year. The committee's work in providing distribution of the malleable handbook to students in engineering colleges, and to young engineers in industry, has been especially successful. Mr. Hobson stated that sponsorship of the fine Market Development Conference at Case Institute of Technology in Cleveland last fall was the high point in the work of the committee during the year. This activity is to be continued.

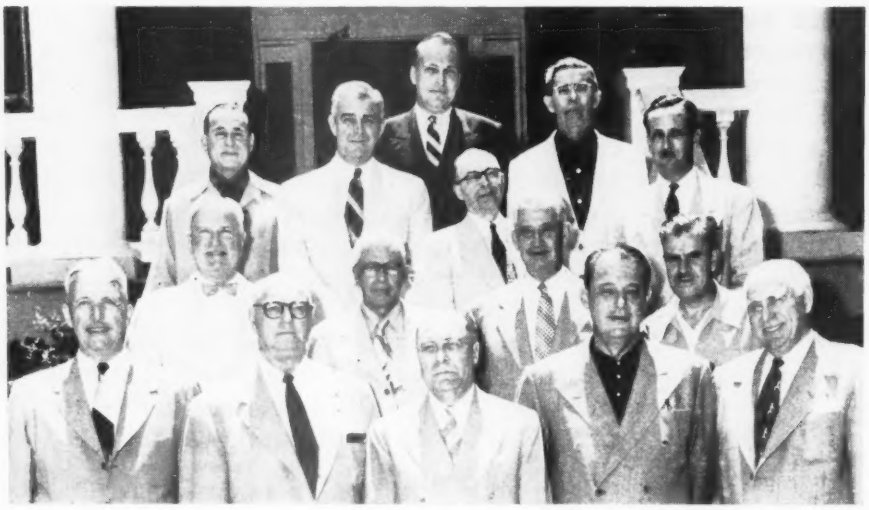
Interest Boys in Industry

R. N. Hoffman, Michigan Malleable Iron Co., Detroit, outlined efforts of the Educational Committee in interesting high school and trade school graduates in the possibilities of the malleable iron industry. Wilson H. Moriarty, National Malleable & Steel Castings Co., Cleveland, in the report of the Finance Committee, indicated the society was in a sound financial condition. Lowell D. Ryan, managing director, read the report of the Plant Operation Committee, which indicated continuation of the society's safety program, and the development of a broader and more active program of personnel relations.

Leon J. Wise, Chicago Malleable Iron Co., Chicago, presented the report of the Research and Product Improvement Committee. He stated that 16 shop practice meetings were held during the year, with discussion including such subjects as foundry sand, patterns and causes of cracks. Mr. Wise outlined the activities during the year of the shop practice engineer and the technical and research director.

W. A. Kennedy, Grinnell Co., Grinnell, Iowa, outlined the work of the Technical Council, and presented the society's research project No. 2 on

(*Concluded on page* 137)



Malleable Founders' Society officers and directors. First row, left to right: J. H. Lansing, technical and research director; Cal C. Chambers, Texas Foundries Inc., Lufkin, Tex.; F. D. Brisse, Laconia Malleable Iron Co, Laconia, N. H.; George T. Boli, Northern Malleable Iron Co., St. Paul; A. F. Jackson, Lake City Malleable Co., Cleveland. Second row: W. H. Moriarty, National Malleable & Steel Castings Co., Cleveland; C. E. Brust, Eastern Malleable Iron Co., Naugatuck, Conn.; R. N. Hoffman, Michigan Malleable Iron Co., Detroit; C. M. Lewis, Badger Malleable & Mfg. Co., Milwaukee. Third row: Max Traum, Newark Malleable Iron Works, Newark, N. J.; W. Scott Roby, Peoria Malleable Castings Co., Peoria, Ill.; Lowell D. Ryan, society managing director; Clarence I. DeShong, Oriskany Malleable Iron Co., Oriskany, N. Y.; C. F. LaMarche, American Malleable Iron Co., Marion O.; R. L. Gilmore, Superior Steel & Malleable Castings Co., Benton Harbor, Mich.

SAF-T-CUT takes Deep-Notch Bite

STRENGTH + SPEED + STAMINA = SAF-T-CUT

OR

SAF-T-CUT = SAFETY + DOUBLE SAVINGS

No matter how you figure it, these nylon reinforced abrasive wheels make sense in your cleaning room. Straight wheels for portable, swing-frame, or other foundry cut-off machines, and raised hub disc-wheels for right angle head portable machines . . . all available in SAF-T-CUT, and each outstanding in its own field of application.

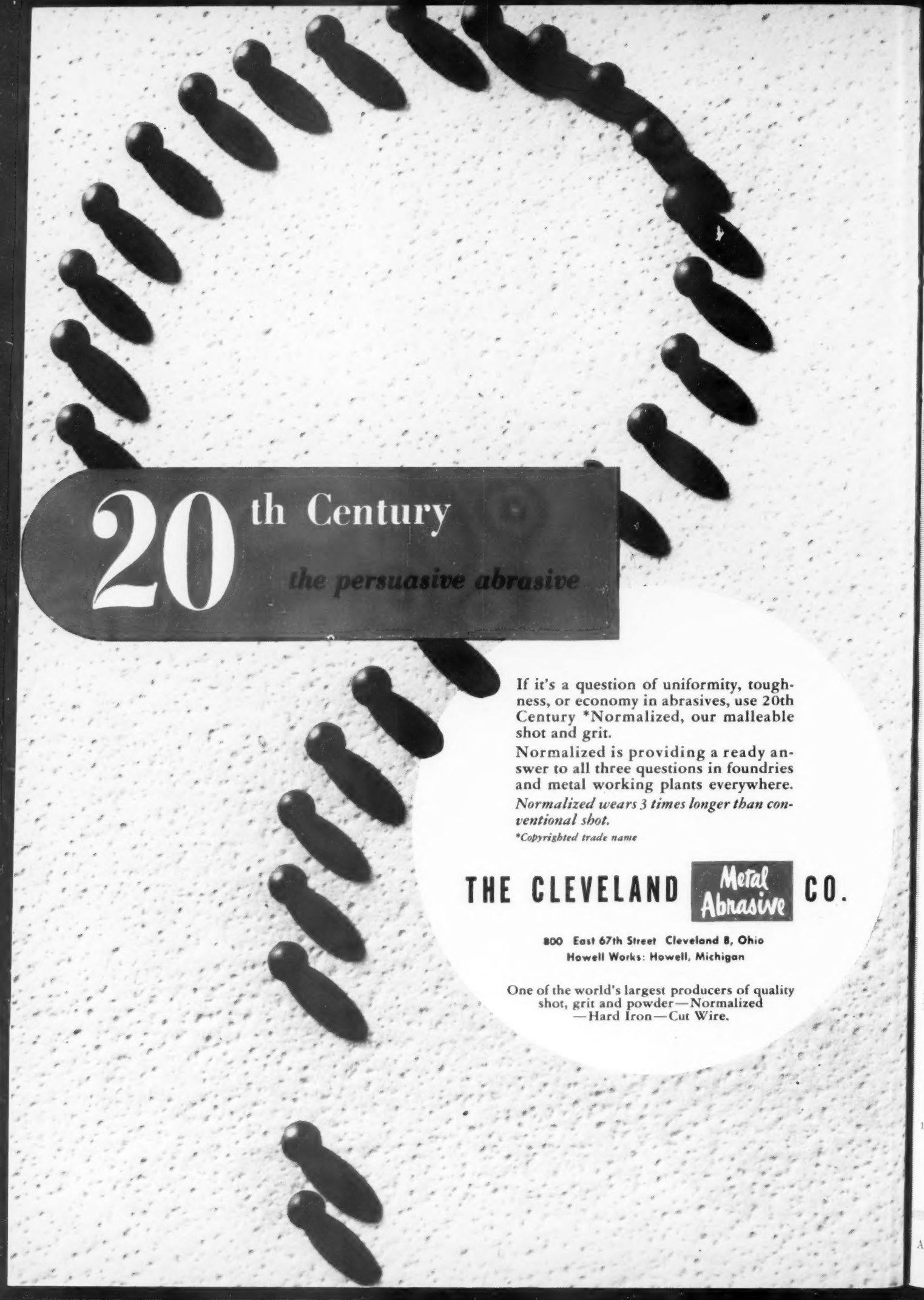
Ask For A Demonstration Today!

BAY STATE ABRASIVE PRODUCTS CO., Westboro, Mass., U.S.A.

Branch Offices and Warehouses —
Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All Principal Cities
In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario

GRINDING WHEEL INSTITUTE MEMBER

BAY STATE ®


20th Century
the persuasive abrasive
If it's a question of uniformity, toughness, or economy in abrasives, use 20th Century *Normalized, our malleable shot and grit.
Normalized is providing a ready answer to all three questions in foundries and metal working plants everywhere.
Normalized wears 3 times longer than conventional shot.
*Copyrighted trade name
THE CLEVELAND Metal Abrasive CO.
800 East 67th Street Cleveland 8, Ohio
Howell Works: Howell, Michigan
One of the world's largest producers of quality shot, grit and powder—Normalized —Hard Iron—Cut Wire.

Foundry STATISTICS

Malleable Iron

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[3]
1950	920,502	512,192	.....
1951			
Apr.	97,276	57,554	276,463
4 mo.	381,907	228,057	.....
May	100,800	61,373	274,954
June	94,376	57,176	258,144
July	76,826	45,072	263,017
Aug.	90,727	57,164	249,273
Sept.	82,276	48,568	244,575
Oct.	93,884	58,251	238,019
Nov.	88,210	53,682	220,740
Dec.	76,045	45,543	215,134
Total	1,083,545	654,380	.....
1952			
Jan.	87,003	54,988	202,799
Feb.	82,898	50,129	193,061
Mar.	80,960	49,084	196,896
Apr.	89,270	56,337	198,215
4 mo.	340,131	210,538	.....

Aluminum

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Die	Unfilled Orders[3]
1950	543,082	184,782	181,366	167,201	.....
1951					
Apr.	40,242	14,455	12,901	12,079	106,077
4 mo.	205,012	72,870	69,306	59,504	.....
May	40,487	14,798	13,400	11,692	112,638
June	35,961	13,853	10,323	10,850	112,760
July	27,426	10,739	7,142	8,693	119,461
Aug.	35,531	14,128	10,922	9,526	117,888
Sept.	32,487	13,086	8,829	9,730	122,973
Oct.	35,222	13,950	10,131	10,297	110,382
Nov.	32,367	12,728	8,816	9,926	116,044
Dec.	30,799	12,587	8,387	8,441	112,479
Total	436,049	164,731	131,258	129,404	.....
1952					
Jan.	46,424	18,051	12,236	13,884	109,654
Feb.	44,847	17,451	13,445	13,012	110,327
Mar.	46,448	19,017	13,673	12,880	104,749
Apr.	49,821	19,451	14,631	14,479	104,336
4 mo.	187,540	73,970	53,985	54,255	.....

Copper-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Sand	Perm. Mold	Unfilled Orders[3]
1950	1,056,973	953,590	55,614	.....
1951				
Apr.	101,506	91,852	5,802	82,711
4 mo.	428,537	385,535	25,421	.....
May	105,438	95,049	5,986	84,002
June	98,559	88,818	5,358	83,518
July	76,551	69,334	4,064	85,837
Aug.	94,443	84,720	5,097	84,821
Sept.	85,433	76,304	5,161	84,611
Oct.	94,706	84,544	5,845	82,491
Nov.	87,764	78,640	5,661	82,667
Dec.	76,526	69,653	4,639	80,435
Total	1,131,402	1,018,973	65,808	.....
1952				
Jan.	89,616	80,376	6,233	78,316
Feb.	86,231	77,813	5,201	75,279
Mar.	88,642	79,437	6,182	72,163
Apr.	84,460	75,590	5,914	70,602
4 mo.	348,949	313,216	23,533	.....

Magnesium

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[3]
1950	15,224	13,310	.....
1951			
Apr.	2,267	2,161	12,191
4 mo.	10,296	9,111	.....
May	2,334	2,206	12,867
June	1,758	1,642	14,331
July	1,676	1,557	15,528
Aug.	2,270	2,135	16,095
Sept.	2,010	1,931	16,407
Oct.	2,371	2,300	16,143
Nov.	2,774	2,461	15,550
Dec.	2,220	2,098	14,729
Total	25,583	24,089	.....
1952			
Jan.	3,569	3,083	14,047
Feb.	3,368	2,940	14,459
Mar.	3,319	2,972	13,279
Apr.	3,025	2,725	13,159
4 mo.	13,281	11,720	.....

Foundry Production Workers

Estimated Number

	Apr. 1952	Mar. 1952	Apr. 1951
Gray Iron	145,800	146,900	163,500
Malleable	25,500	25,200	27,700
Steel	66,700	66,200	60,800
Nonferrous	95,200	93,600	93,200

Average Weekly Earnings

Gray Iron	$68.47	$69.71	$71.04
Malleable Iron	69.20	68.64	75.21
Steel	75.35	77.55	75.56
Nonferrous	74.91	77.03	73.69

Average Weekly Hours

Gray Iron	39.9	40.6	42.9
Malleable Iron	38.9	38.8	43.2
Steel	41.7	42.4	43.3
Nonferrous	40.8	42.0	42.4

Labor Turnover Rate (Mar.)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	4.0	4.1	2.7	0.7
Malleable Iron	3.0	3.9	2.3	0.9
Steel	3.1	3.7	2.4	0.6
Nonferrous	5.2	4.6	2.0	1.4

Source: Bureau of Labor Statistics

Gray Iron Castings—Shipments

(Net tons[1])

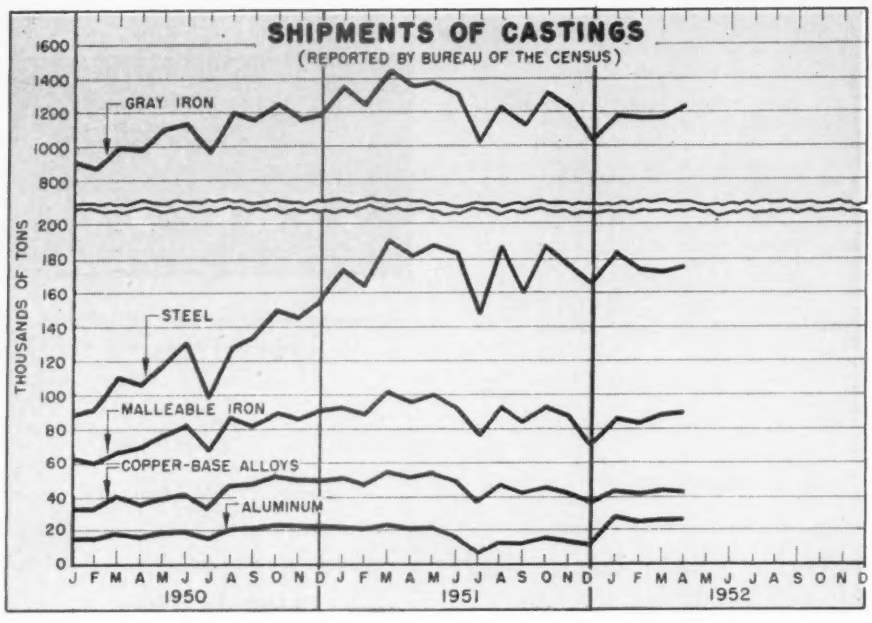
	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Chilled Railroad Car Wheels—For Sale	Pressure Pipe & Fittings Total[2]	Soil Pipe & Fittings Total[2]	Unfilled Orders[3] Total
1950	12,905,562	6,880,352	8,117,748	3,415,281	2,308,661	1,043,590	514,074	456,402	1,203,762	761,317	.....
1951											
Apr.	1,363,041	766,735	880,381	403,619	217,970	106,417	61,993	54,002	134,302	68,395	2,336,926
4 mo.	5,401,987	3,032,496	3,489,522	1,607,447	872,295	416,348	235,744	204,275	526,924	277,502	.....
May	1,396,236	796,053	897,913	418,950	225,129	112,145	65,721	57,485	139,854	67,619	2,228,596
June	1,308,987	742,794	847,024	395,329	216,620	108,042	58,620	52,700	121,851	64,872	2,162,152
July	1,028,812	568,126	653,656	301,749	200,764	97,575	40,792	35,202	88,217	45,383	2,208,116
Aug.	1,218,832	697,952	779,838	378,042	222,721	109,257	50,127	44,507	115,284	50,862	2,144,587
Sept.	1,114,789	625,511	704,657	328,331	204,856	96,011	45,467	41,360	111,893	47,916	2,055,392
Oct.	1,301,681	732,764	815,815	382,405	244,556	115,738	53,172	46,483	130,636	57,502	1,983,307
Nov.	1,183,833	674,139	737,971	348,991	222,665	107,569	48,759	43,141	129,766	44,672	1,933,972
Dec.	1,032,799	582,614	646,352	309,696	204,911	94,857	41,594	38,119	108,767	31,175	1,847,065
Total	14,987,696	8,449,515	9,571,570	4,469,069	2,624,517	1,257,542	633,996	563,272	1,474,110	699,000	.....
1952											
Jan.	1,199,285	694,498	745,548	359,806	225,704	110,263	57,155	53,551	125,729	45,149	1,800,905
Feb.	1,155,143	654,833	733,067	348,885	219,251	105,918	50,444	47,649	107,669	44,712	1,766,434
Mar.	1,172,017	660,920	723,225	334,492	228,799	110,607	53,919	49,747	115,843	50,231	1,711,037
Apr.	1,204,801	652,962	773,538	347,121	204,805	85,239	48,506	42,650	117,929	60,023	1,614,426
4 mo.	4,731,246	2,663,213	2,975,378	1,490,304	888,559	412,027	210,024	193,597	467,170	210,115	.....

Steel Castings—Shipments

(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[3] Total
1950	1,459,382	1,042,884	261,357	1,081,162	788,619	243,215	379,220	254,265	18,142	.....
1951										
Apr.	181,908	129,059	41,545	139,948	102,367	37,553	41,960	26,692	3,992	846,947
4 mo.	702,705	504,401	170,911	543,469	400,770	151,588	159,246	102,631	19,223	.....
May	189,232	131,102	39,845	143,201	101,363	35,511	46,031	29,739	4,334	881,702
June	184,424	131,219	42,337	141,538	103,090	38,200	42,886	28,129	4,137	895,054
July	147,251	100,141	27,585	111,964	78,034	24,516	35,287	22,107	3,069	929,978
Aug.	177,096	128,981	41,763	130,913	99,732	36,086	46,183	29,249	5,677	944,211
Sept.	160,695	116,658	35,500	120,632	89,771	33,086	40,063	26,887	2,414	918,038
Oct.	189,929	139,953	39,984	138,610	104,449	36,488	51,319	35,504	3,496	891,508
Nov.	176,728	131,276	35,034	126,544	95,180	31,099	50,184	36,096	3,935	865,029
Dec.	165,110	123,448	33,213	119,762	89,298	29,341	45,348	34,150	3,872	846,436
Total	2,100,970	1,507,179	476,372	1,583,375	1,162,687	415,955	527,695	344,492	50,457	.....
1952										
Jan.	183,738	139,488	37,091	133,985	102,265	31,806	49,753	37,223	5,285	869,299
Feb.	174,626	133,602	31,719	125,484	94,969	28,251	49,142	38,633	3,468	856,872
Mar.	173,694	131,997	32,118	125,787	95,206	27,782	47,907	37,196	4,336	857,115
Apr.	175,075	134,325	33,549	126,628	97,128	29,798	48,447	37,654	3,751	842,970
4 mo.	707,133	539,412	134,477	511,884	389,668	117,637	195,249	150,706	16,840	.....

[1] Source: Bureau of the Census. [2] All cast iron pipe is shipped for sale. [3] For sale only.



Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1951	1952
Jan.	668.0	404.5
Feb.	638.6	200.4
Mar.	599.0	310.0
Apr.	490.1	385.1
May	431.7	225.2
June	393.2	....
July	390.3	....
Aug.	404.5	....
Sept.	346.5	....
Oct.	372.4	....
Nov.	305.5	....
Dec.	230.5	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Coke Production and Consumption

(Net tons*)

	Production	Consumption Total	Consumption By Foundries
1950	72,718,038	73,373,618	3,523,396
1951			
Apr.	6,471,316	6,335,793	357,018
4 mo.	25,973,898	25,875,316	1,282,645
May	6,730,122	6,716,780	367,946
June	6,567,640	6,638,043	324,758
July	6,629,863	6,495,585	301,447
Aug.	6,768,161	6,674,495	299,027
Sept.	6,470,658	6,366,969	274,017
Oct.	6,742,767	6,727,211	292,737
Nov.	6,501,098	6,562,279	272,338
Dec.	6,738,759	6,821,446	249,490
Total	79,122,966	78,868,124	3,664,404
1952			
Jan.	6,804,106	6,760,011	261,148
Feb.	6,358,715	6,411,905	251,125
Mar.	6,779,639	6,743,944	264,488
Apr.	5,809,451	5,775,781	264,384
4 mo.	25,751,911	25,691,641	1,041,145

Ingot Brass and Bronze

(Shipments in net tons)

	1951	1952
Jan.	28,416	28,315
Feb.	27,168	24,211
March	31,997	23,890
Apr.	30,472	22,547
May	33,267	21,740
June	33,817	.....
July	32,016	.....
Aug.	25,285	.....
Sept.	22,285	.....
Oct.	23,124	.....
Total for year	332,378	.....

Zinc-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1950	579,332	376,681	.....
1951			
Apr.	43,513	28,565	101,949
4 mo.	183,542	122,328	.....
Total, 1951.	450,375	291,796	.....
1952			
Jan.	38,027	24,974	70,262
Feb.	34,307	23,006	70,034
Mar.	35,083	23,443	67,846
Apr.	37,252	23,713	63,768
4 mo.	144,669	95,136	.....

Pig Iron Production and Consumption

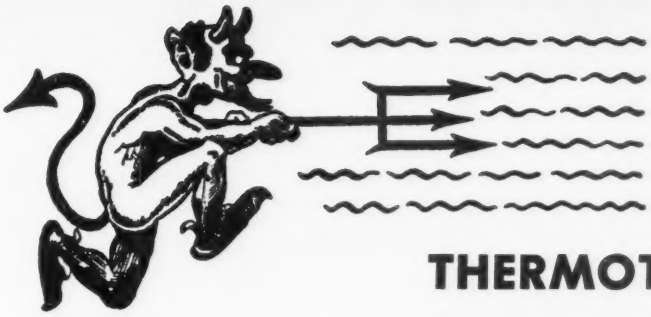
	Production** (Standard grades—1000 net tons) Total	Foundry	Malleable	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace, 1000 gross tons) Total	Cupola	Air	Electric
1950	64,589.1	2,870.4	3,034.2	50,450.5	8,234.0	58,416	5,475	319	326
1951									
Mar.	5,919.3	267.9	276.5	4,647.5	727.5	5,406	550	33	15
3 mo.	16,805.8	806.6	735.8	13,184.5	2,079.0	15,498	1,584	94	36
Apr.	5,812.2	259.1	261.0	4,575.8	716.1	5,281	516	31	11
May	6,104.9	282.0	259.4	4,777.0	786.5	5,522	533	31	11
June	5,911.3	254.2	276.5	4,631.9	748.7	5,348	486	30	11
July	5,994.8	280.4	250.0	4,702.8	761.6	5,317	378	23	10
Aug.	5,988.6	252.7	254.4	4,723.3	758.2	5,358	465	30	11
Sept.	5,811.6	257.7	243.7	4,576.8	733.4	5,266	431	27	12
Oct.	6,112.6	260.6	299.4	4,777.4	775.2	5,601	489	31	14
Nov.	5,824.5	285.5	269.0	4,532.1	737.9	5,287	448	29	9
Dec.	5,898.1	247.4	257.5	4,653.0	740.2	5,282	401	28	11
Total	70,264.5	3,186.2	3,169.0	55,134.1	8,774.8	63,760	5,731	354	136
1952									
Jan.	5,964.3	233.1	285.8	4,672.3	773.1	5,452	466	29	14
Feb.	5,701.8	245.2	261.4	4,496.9	698.3	5,139	441	29	11
Mar.	6,226.2	250.3	273.1	4,895.9	806.9	5,552	433	27	7
3 mo.	17,892.3	728.6	820.3	14,065.1	2,278.3	16,143	910	85	35

* Source: U. S. Dept. of Interior, Bureau of Mines. ** Source: American Iron & Steel Institute. [1] Source: Bureau of the Census. [2] For sale only.

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap—Total	All Scrap—Purchased	By Types of Furnace: Cupola—Total	Cupola—Purchased	Air—Total	Air—Purchased	Electric—Total	Electric—Purchased
1950	61,497,000	29,403,000	9,474,000	4,666,000	1,118,000	407,000	6,385,000	3,828,000
1951								
Mar.	6,187,520	3,100,622	1,064,325	558,833	108,513	39,260	728,786	463,371
3 mo.	17,500,464	8,802,614	3,010,385	1,584,933	319,750	118,511	2,040,578	1,297,818
Apr.	5,987,947	3,013,527	1,029,069	545,897	103,458	37,973	704,416	457,521
May	6,096,678	3,087,313	1,063,281	568,198	111,914	39,312	734,483	484,878
June	5,693,402	2,847,856	972,949	517,604	108,740	39,454	693,636	462,092
July	5,298,644	2,581,856	747,864	393,254	80,903	29,858	632,782	421,689
Aug.	5,614,535	2,721,287	918,180	487,085	104,809	37,592	720,020	475,190
Sept.	5,377,491	2,585,665	811,332	427,035	93,166	33,640	688,941	460,446
Oct.	5,869,590	2,826,221	951,406	504,804	102,950	38,534	750,915	489,217
Nov.	5,596,368	2,699,556	847,991	451,591	90,302	33,795	738,589	489,999
Dec.	5,483,089	2,656,536	738,150	398,538	87,748	32,430	687,559	450,155
Total	68,518,208	33,822,431	11,090,607	5,878,939	1,203,740	441,099	8,391,919	5,389,005
1952								
Jan.	5,847,011	2,788,426	846,891	449,935	101,211	38,150	743,233	470,126
Feb.	5,572,506	2,702,092	789,293	419,279	94,900	35,536	697,319	440,325
Mar.	5,902,529	2,860,364	791,165	415,853	92,751	35,013	741,793	475,161
3 mo.	17,322,046	8,350,882	2,427,349	1,285,067	288,862	108,699	2,182,345	1,385,612

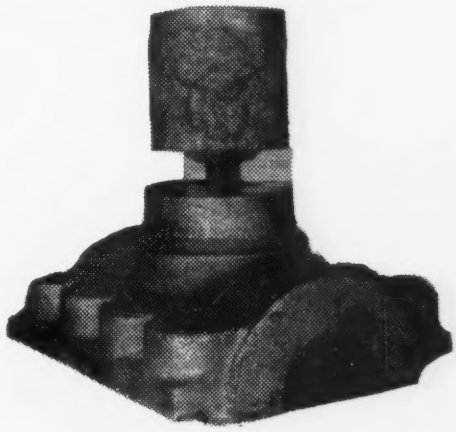


Soffel's

THERMOTOMIC COMPOUNDS
(Patented)
and CARBON FREE LIQUIDIZERS

Keeps metal molten!

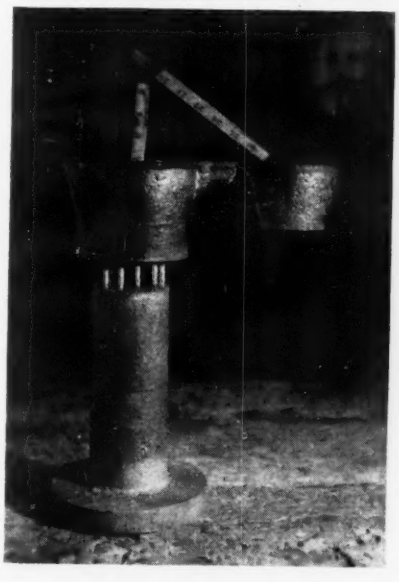
. . . for Steel, Iron, Aluminum, Brass, Bronze, Copper



300 lb. aluminum bronze bearing cap cast with THERMOTOMIC feeding ring core under riser. Note small feeder opening which facilitates removal of riser from casting, resulting in greatly reduced cleaning costs.

THERMOTOMIC X is a patented Exothermic compound that can be molded into any desired shapes and used as feeding ring inserts under risers or as facing application where it is desired to maintain fluidity of the casting metal. **THERMOTOMIC** permits reversal of the trend towards large feeding heads and risers, making it possible to use heads that are shorter and more compact with 1½" feeder openings. This permits easy removal of heads and gates and sharp reductions in cleaning and finishing costs. When **THERMOTOMIC** is used as inserts or as facing in the mold, heat at thin metal sections is retained until the main body of the casting has solidified, thus eliminating shrink cracks and improving grain structure and tensile strength.

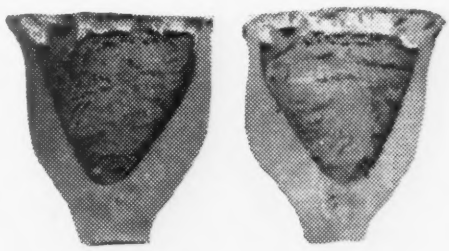
THERMOTOMIC STRAINER CORE



PRODUCES
Monel Casting
270 lbs. solid

Made by direct pouring through the Thermotomic strainer core under the feeding head.

No chills were used, no shrinkage at the flange. Note depth of shrinkage in the feeding head



NOTE THESE TYPICAL RESULTS FROM THE USE OF SOFFEL'S CARBON FREE LIQUIDIZER

This six inch by six inch chrome-nickel-steel riser, with the application of 1 pound of SOFFEL'S CARBON FREE LIQUIDIZER, the average weight was reduced from 32 pounds to 13 pounds, a savings of 19 pounds of saleable metal which normally would have been discarded as scrap, but which was fed into the casting and produced a heavier, sounder casting. Note the feeding head can be knocked off easily saving burning costs. There is no better feeding head compound at any price than SOFFEL'S CARBON FREE LIQUIDIZER.

BEWARE OF IMITATIONS! We are the originators of CARBON FREE LIQUIDIZER and THERMOTOMIC COMPOUNDS

Pittsburgh Metals Purifying Company

WORLD'S LARGEST MANUFACTURERS OF FLUXES AND PURIFIERS FOR ALL METALS AND ALLOYS

1352 MARVISTA ST., N.S. **PITTSBURGH 12, PA.**

. . . makes BUFFALO PATTERNS COST LESS

Intricate hand wood carving has almost disappeared from the commercial scene today. It is available only to those willing to pay a substantial *premium* for this kind of craftsmanship.

However, the fine craftsmanship you'll find here at Buffalo is getting more popular every year and . . . you NEVER pay a premium for it! We don't mean that our patterns cost less . . . in fact you'll probably pay a bit more for a Buffalo Pattern. But . . . the difference is in the craftsmanship. Here, for more than three generations, father has taught son, and "pride in a job well done" is a plus value on every job that goes out of our shop. That's why producers of luxury motor cars, jet aircraft and low priced farm implements all look to Buffalo for the unbeatable combination of quality, precision and economy.

Next time you have an important pattern job, let one of our engineers completely plan the job and put it through our shop. Then YOU be on hand to see it installed! That's when you'll see that our equipment fits your set up like a well-worn glove. There'll be no adapting or extra rigging to do, and your extremely low scrap ratio will more than pay the difference for a Buffalo Pattern.

OUR COMPLETE LINE OF PRODUCTS

Shell Mold Pattern Equipment of All Types, Completely Rigged.

•

Wood Experimental Equipment. Combination Wood and Metal Semi-production Equipment.

•

Machined Metal High-production Equipment, any size.

•

Complete Engineering Drawings of All Component Parts of a Pattern Equipment.

•

Forging Dies of All Types and Sizes.

•

Commercial Non-ferrous Castings.

•

Shell Mold Castings.

•

Permanent Molds for Fiberglass or Plastic Molding and Metal Castings.

•

Metallizing

BUFFALO PATTERN WORKS, INC. • 830 HERTEL AVE., BUFFALO 16, N. Y.

DESIGNERS AND MANUFACTURERS OF PATTERN EQUIPMENT FOR OVER HALF A CENTURY

(*Concluded from page* 130)

"Gating and Feeding of Malleable Iron." Part I of the report, just issued, deals with "Castings Fed by a Single Top-Blind Feeder." Special attention was called to Fig. 1 in the report which is a chart containing two areas showing the boundary between solid castings and castings with shrinkage, as determined by experiments recorded in the report. The ordinate of the diagram is the volume ratio which is related to the amount of metal needed in the feeder to supply liquid metal to the casting during solidification. The abscissa is called the solidification ratio, and gives an indication of the relative times required for the solidification of the casting and the feeder. While the relationship was determined from simple cylinder and plate castings whose volume and areas were varied to cover the range of values necessary for most casting problems, it can be applied to more complicated castings where one top blind feeder is required.

Government Specifications

James H. Lansing, technical and research director, discussed activities in connection with government specifications, shell molding and the use of malleable castings at subzero temperatures. He then presented the progress report on research project No. 3, dealing with "Malleable Core Materials and Practice." This extensive report recently has been published and distributed to the membership. It was undertaken to promote a better understanding and more effective and economical use of core materials by member companies.

Many interesting conclusions were drawn from a survey of the core practices followed by member foundries. For example, it was found that nearly 85 per cent of malleable foundrymen prefer to use more than one base core sand. Cereal binders are used by 96 per cent in their core mixes. All malleable foundrymen use core oil of the commercial grades and about 8 per cent prefer to use linseed oil in special applications. About 22 per cent report using urea and phenol base synthetic resins in some cores and 6 per cent use these binders for 80 per cent of their production. Iron oxide and silica flour are used by 51 per cent to increase core sands' hot strength and density. Most commonly used collapsibility additive is wood flour. Seventy-eight per cent prepare their core sand by mulling, and 86 per cent use all dried sands or some dried sands. Close to 50 per cent of all malleable core production is by blowing.

Arthur F. Jackson, Lake City Malleable Co., Cleveland, reported on work of the ferrous foundries, under sponsorship of the National Castings Council, in attempting to secure a more effective setup for these foundry industries in NPA.

Lowell D. Ryan, managing director, paid tribute to retiring president Cal C. Chambers, for his effective leadership and untiring efforts on behalf of the society during the past year. Mr. Ryan also cited the chairmen and members of the various society committees and praised the staff of the society for a fine co-operative job during the year. Mr. Ryan stated that the outline of activities of the society for the past year and the listing of projects to come, had been given the title of "Report to Shareholders" advisedly, for the members actually are the shareholders. The society is run for the benefit of the shareholders, and any ideas which will improve the functioning of the organization should be passed along to the home office. The managing director emphasized that if the past year has been good, as represented in the report, let's make the next one better.

An historical survey on how we got where we are now was presented by Donald R. Richberg, University of Virginia, Charlottesville, Va. Starting back in biblical times when the Israelites were demanding a king because they wanted to "be like all the nations," the speaker traced the many periods of history when the ruling doctrine of the tyrants has been that authority of the government must be supreme to regulate the lives and labors of all the people, regardless of any individual ambition or demand for freedom or claim of natural rights.

Warns of Retreat to Socialism

Mr. Richberg stated that the reason for our retreating from the successful new order established after the revolution, and the re-establishing of failures of the old order, rests chiefly with two world wars. But if we were only centralizing our government for defense and sternly maintaining individual freedom in domestic affairs, we would not be engaged in retreating to socialism. But if we cannot be warned by historic lessons of the utter folly of our domestic socialization of agriculture and industry, our social security programs, our point four programs, our socialized world government programs, we should be able to read the warnings from other developments. These include the impossibility of reforming the world by an international benevolent socialism, such as we have attempted in Japan, and the stranglehold of the monopolists of labor which inevitably will destroy the free economy of all the people.

Lee C. Shaw, Seyfarth, Shaw & Fairweather, Chicago, speaking on "Is Management Prepared To Meet Current Labor Problems?" indicated there has been too much passing the buck in contract negotiation. There has not been a willingness to recognize the importance of the individual in standing up to the collective force of the unions. Mr. Shaw emphasized the importance of the foreman as a leader of employees, and indicated that top management has neglected this important means of personnel communication.

Christiansen Corp. Offers New Type Bond

An unusual type of industrial financing has been announced by Edward S. Christiansen, president, Christiansen Corp., Chicago, producer of aluminum and magnesium alloy ingot, zinc-base die casting alloys and various foundry products. The company is issuing 20-year debentures in $100 multiples which incorporate escalator provisions based on the consumers' price index of the Bureau of Labor Statistics. In the event of rising prices, as measured by the index, the debenture value at retirement would reflect the increase up to a maximum of 150 per cent. However, the minimum will not be below the $100 face value.

EDWARD S. CHRISTIANSEN

The 4½ per cent interest rate will be constant, but actual payments also will vary with the price index. The debentures, totaling $300,000, are being offered to employees of Christiansen Corp. and its four subsidiaries—Magnesium Co. of America, Alumicast Corp., Industrial Smelting Corp. and Titanium Co. of America.

AROUND THE COUNTRY

News Reports from . . .

THE STEEL strike disrupted auto producers' plans in several instances. Chrysler's 1953 models were scheduled for press introduction in September but now seem stymied at least until October. A radically different small car at Hudson was also delayed. Using the down-time for model changeover was decided as impractical for some automakers because of their earlier commitments on materials and because necessary tooling was also delayed.

The new engines scheduled for appearance in a handful of 1953 passenger car models and a large volume farm tractor have given considerable work to pattern shops, but foundry activity as a whole seems to be tending down. One of the large props has been the demand for machine tool bases, hydraulic cylinders and other castings associated with capital goods equipment. Several foundries previously reporting heavy backlogs for such castings now say they are caught up and working almost hand to mouth.

Shell molding is gradually coming out of its cocoon of secrecy, but probably the largest and most successful practitioner—Ford Motor Co.—continues to hold its official silence about the development. General Motors, whose work with shell molding is also well advanced, has gone on record as saying that what is required to make this process of greater commercial appeal is a cheaper resin for the sand mix. Some other foundrymen who admittedly are intrigued with the process, warn that it is not likely to make its largest gains as a foundry method until it can be used in relatively more intricate castings than can currently be cast successfully.

Speaking of intricate castings, some of the most eye-opening from a foundryman's standpoint are those being supplied Packard for its newly designed family of marine diesel engines which that company is about to deliver to the Navy for use in minesweepers. These include V-8s, 12s and 16s and an in-line six, and weigh only about a third of equal horsepower diesels they replace.

The light metals are on the verge of coming into their own in several new automotive applications. DeSoto has adopted a die-cast aluminum carburetor to replace zinc, for a savings of more than 50 per cent in weight. General Motors' Research Laboratories Division's general manager notes that magnesium is approaching cast iron's price in certain applications and adds that it may find extensive use in passenger car wheels to reduce unsprung weight.

CURRENT and prospective improvements in the magnesium foundry of Ford Aviation Engine Division, here, are expected to make the facility "unsurpassed in industry."

One project now being completed will eliminate sulphur dioxide odor. This is being accomplished by installation of air-tight doors on the redesigned and rebuilt heat treating ovens. The doors, weighing 1800 pounds, were fabricated in the plant.

Ventilation and sound conditioning are two future projects. Under present plans, chipping and sand blast areas will be sound conditioned and a pneumatic sand handling system will aid ventilation.

Other projects include improved lighting, an addition to the monorail system for handling cores, new type saws in pattern shops, tunnel ventilation, and new type sand conveyors.

Also in the offing is a breezeway between two buildings. This will help to keep stock dry during transfer and will assist in providing the proper controlled heat system.

Installation has been completed of what is said to be the world's largest core blower and a second of same size is now going in. These are 56-in. Internationals operating with air at 100 psi. The machines fill core-boxes with sand in a matter of seconds.

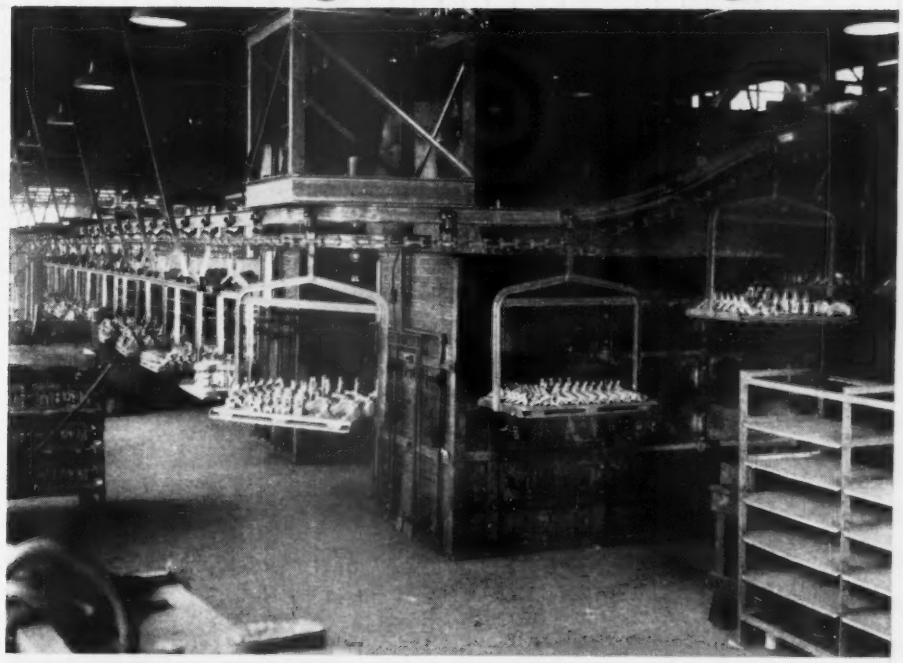
THE PROLONGED steel strike is having an adverse effect on foundry activity. With many manufacturers of consumer products facing shutdown due to lack of finished steel, and others tapering production drastically, few are inclined to stock up on castings. Consequently, gray iron shops are experiencing lagging demand. Activity in steel, aluminum and magnesium castings is still good, sustained by defense work.

Defense production in the West has probably been harmed less by the loss of steel than have other regions. The rate of ingot production in the western region last month stood at 33 per cent of theoretical capacity compared with 12 to 14 per cent for the nation as a whole. The strike-free Kaiser Steel Corp. Fontana mill, normally supplying 22.6 per cent of western steel production, and currently supplying 68 per cent, is helping alleviate the steel shortage in this area.

Foundrymen may benefit from better business conditions forecast by an optimistic report from the California Manufacturers' Association. For the first time in 18 months the association's quarterly poll of the state's manufacturers indicated they expect greater sales ahead despite the steel strike. At the peak of the

(*Concluded on page* 140)

Mathews Engineering



-paying off in increased production . . .

● When you incorporate conveyers and conveying systems into your foundry operation . . . increased production results. More castings at less cost and better working conditions are gained.

Conveyer systems, designed and manufactured by skilled engineers and craftsmen, play an important part in foundry mechanization programs. Today, Mathews' Engineers are making available to American and Canadian Foundrymen long experience with foundry conveying problems. All this experience, plus the facilities of three modern plants, is ready to go to work for you. Write for further information and literature.

MATHEWS CONVEYERS

GENERAL OFFICES *Mathews Conveyer Company . . . . Ellwood City, Pennsylvania*
PACIFIC COAST DIVISION *Mathews Conveyer Company West Coast . . San Carlos, California*
CANADIAN DIVISION *Mathews Conveyer Company, Ltd. . . . . Port Hope, Ontario*

(*Concluded from page* 138)

rise in the defense production boom, manufacturers in California were almost unanimously optimistic. But for the last 18 months the trend has been downward without interruption until the current poll was taken.

The scrap market is in the doldrums. There is little demand for steel and cast scrap from the ferrous shops. It's abundant and prices are soft. Nonferrous scrap is scarce and demand is strong from the nonferrous foundries. Generally, scrap supply locally is far greater than demand.

Cleveland

EFFORTS of local foundry men and patternmakers recently have been directed through Northeastern Ohio Chapter of the AFS and the Pattern Manufacturers' Group of Associated Industries of Cleveland to inform local draft boards of the importance of workers in the two industries. On June 12 board members were conducted on a tour through Eberhard Mfg. Division, Eastern Malleable Iron Co., to inform them of the importance of employee skills in various phases of foundry work. Arrangements for the tour were made by NEO chapter through Dan Burdette, Eberhard personnel manager.

Greater Cleveland draft board members who participated in the tour included Arthur A. Beduhn, chairman, draft board 32; Frank L. Combs, secretary, board 27; Louis A. Bodnar, chairman, board 26; A. B. Clark, secretary, board 21; William McCutcheon, vice chairman, board 22, and Tracy E. Herrick, vice chairman, board 30. Thomas Gallagher, personnel director, Lake City Malleable Co., also made the tour along with Mr. Burdette and other members of Eberhard.

After the tour, members of the group assembled at the Cleveland Athletic Club for dinner and roundtable discussion. There they were joined by M. D. Gustin, vice chairman, board 27 and chapter members.

Consensus among attending board members was that they had learned much regarding the importance of castings to the national defense effort, about worker skills required in all phases of casting production, and of the length of time it takes to train foundry workers and for them to master the skills of their craft.

Following an impressive impromptu talk by Mr. Gallagher outlining these points, the board members overwhelmingly supported the suggestion by one of their group that this essential information regarding foundry workers and their skills be published and distributed to all boards.

"Because," they said, "it will dispel the opinion we held before this meeting, that the production of castings was a hard, dirty job, performed, in most part, by unskilled laborers."

A few months ago the Pattern Manufacturers' Group had similar success in acquainting a large number of draft board members with the importance of skilled and semiskilled patternmakers when it sponsored a tour through Motor Patterns Co.

Members of Greater Cleveland draft boards recently toured Eberhard Mfg. Division. Left to right are: Frank L. Coombs, board 27; Arthur A. Beduhn, board 32; Louis A. Bodnar, board 26, with C. H. Lambert, plant superintendent

Philadelphia

FOUNDRY activity is following somewhat the pattern of recent weeks. Steel foundries are busy, malleable shops moderately so, gray iron plants fair and nonferrous shops fair to poor. The general melt in all classifications is off somewhat from late spring and early summer due to hot weather and to mass vacations, with entire plants closing down for a week or two. General expectation is that the trend will be slightly higher in August but will show no appreciable gain before early fall. September is likely to mark the real turn, most observers believe.

Gray iron shops, barring suspensions for vacation, are averaging close to four days a week. Backlogs are averaging not more than three to four weeks, with some plants pretty much on the "touch and go" basis. Notable exceptions are the pressure pipe people, which have considerable work ahead. Soil pipe foundries are moving at a fairly good clip. There is relatively little defense work and it is mostly squeezer work for which there is much competition. Pig iron supply is adequate, due primarily to the fair state of inventories at most consuming plants. Scrap supply is ample, with prices easy.

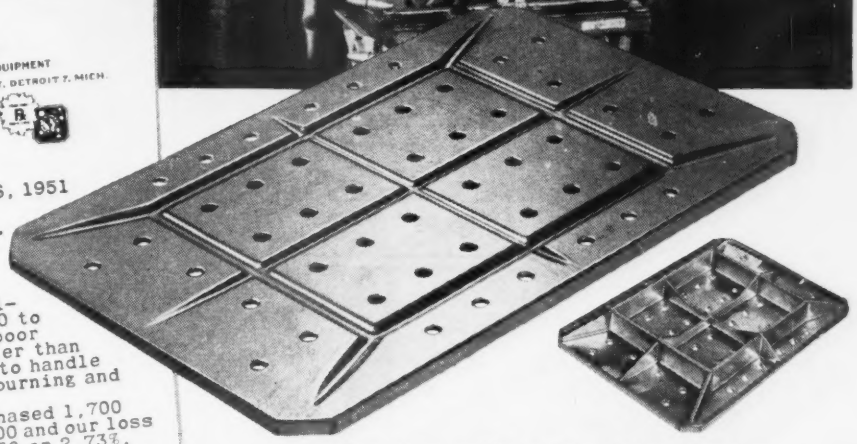
Steel casting shops, what with vacations and a continued good demand, are making little inroads in their backlogs, which remain well extended—possibly 18 to 20 weeks on an average. Steel foundries are operating generally at least five days a week. Demand includes considerable munitions work, and castings for power plant equipment, heavy trucks and general machinery. Railroad business is off some, but this is expected to be only temporary.

Malleable shops are operating around five days a week, although with somewhat reduced forces, and have backlogs of six to eight weeks in most cases. Railroads and the agricultural equipment builders are exerting less pressure, and compared with a few weeks ago automotive demand has eased, due primarily to complications set up by the steel strike.

Nonferrous business is much the same as it has been for the past few months. Shops equipped to handle government work are busy. Those which are not, and they include a large number of small units, find business sluggish.

"EDCO Dowmetal BOTTOM BOARDS have resulted in tremendous savings for our foundry"

... says M. C. Crawford of RILEY STOKER CORPORATION



Above photo shows molder at Riley Stoker Corporation placing EDCO Bottom Board on flask preparatory to pressing. EDCO DOWMETAL magnesium boards maintain high quality of castings and reduce rejects because the exclusive grooved and vented design permits escape of gasses and insures mold stability.

RILEY STOKER CORPORATION
FUEL BURNING AND STEAM GENERATING EQUIPMENT
101 WALKER STREET, DETROIT 7, MICH.

Christiansen Corporation
1515 North Kilpatrick Ave.
Chicago 51, Illinois

May 16, 1951

Attn: Mr. Edw. S. Christiansen, Pres.

Gentlemen:

Before the purchase of EDCO Dowmetal Bottom Boards, we made our own wood boards at a cost of approximately 70c each. We would make 5,000 to 6,000 per year and ended up with a poor quality board. They were much heavier than EDCO magnesium boards, not as easy to handle on the line, and our losses due to burning and breakage were 60 to 80% per year.

In three years time, we have purchased 1,700 of your boards at a cost of $7,585.00 and our loss in this period has been only $207.36 or 2.73%.

EDCO Dowmetal Bottom Boards have resulted in tremendous savings for our foundry. It is a pleasure to recommend them to other foundries.

Yours very truly,
RILEY STOKER CORPORATION
M. C. Crawford
M. C. Crawford
Director of Purchases
Detroit Plant

Progressive foundry operators, like Riley Stoker Corporation, are equipping their foundries with EDCO DOWMETAL Bottom Boards.

Made of magnesium, these boards will not warp or break. There are no nails to come out, nothing to break or split—no upkeep! So durable, they can be considered permanent equipment. The many advantages from the use of these boards are effective immediately on their installation.

Write us or phone CApitol 7-2060 today for complete price schedule and list of 74 standard sizes available from stock.

Riley Stoker Corporation is one of the three largest manufacturers of steam generating and fuel burning equipment in the country. EDCO DOWMETAL Bottom Boards are used exclusively in their foundry in the production of gray iron and alloyed casting components.

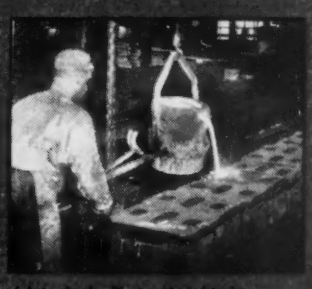
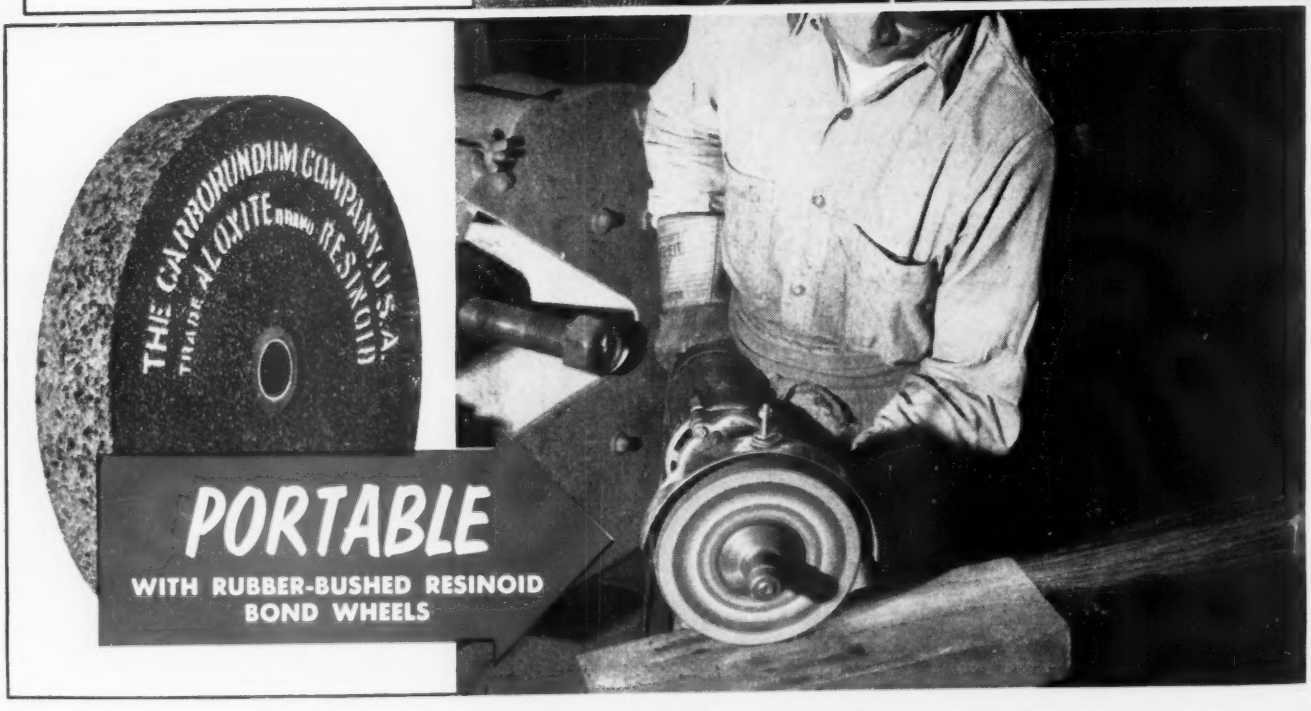


Photo at left shows molder pouring sand into flask. Photo at right shows molten metal being poured into molds which rest on EDCO Bottom Boards. Gravity conveyor line carries molds on for further processing.

EDCO CHRISTIANSEN CORPORATION

CHRISTIANSEN CORPORATION
1517 N. KILPATRICK AVE. • CHICAGO 51, ILLINOIS
ALUMINUM ALLOY INGOTS • ZINC BASE DIE CASTING ALLOYS

SNAGGING . . .



Only CARBO

TRADE

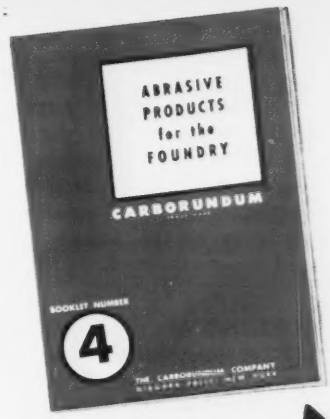
"Carborundum" and "Aloxite" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York

Snagging Wheels by CARBORUNDUM offer you the ideal cost-cutting combination of the *right* abrasive grain and the *right* bond, tailored to *your* work and *your* equipment. Check the table:

BEST FOR SNAGGING	STEEL castings and forgings—and high tensile non-ferrous materials	IRON cast, grey, chilled—hard malleables and low tensile non-ferrous materials
ON HIGH-SPEED GRINDERS (9500 SFPM and lower)	*Use* "ALOXITE" aluminum oxide B5 resinoid wheels	*Use* "CARBORUNDUM" silicon carbide B5 resinoid wheels
	THE NEW B5 RESINOID BOND imparts for greater strength to wheels—provides high resistance to mechanical shock and heat shock. This means added safety and lower fatigue, in addition to a high cutting rate and long wheel life.	
ON LOW-SPEED GRINDERS (6500 SFPM and lower)	*Use* "ALOXITE" aluminum oxide V10 vitrified wheels... tough, sharp grain in a new, rugged long-lasting bond especially developed for this service	*Use* "CARBORUNDUM" silicon carbide VD vitrified wheels... newly developed blocky, friable abrasive in a new high-efficiency bond

For every abrasive job in your foundry—whether your need is for straight wheels, disc wheels, mounted points, cones and plugs, core files—there's an abrasive product by CARBORUNDUM designed to do the job better, faster, at lower cost.

ORDER FROM YOUR CARBORUNDUM DISTRIBUTOR TODAY. He's your best bet for complete stocks, prompt delivery, experienced counsel on latest developments in the field. You'll find him listed in the yellow pages under "Abrasives." Phone him today—it's to your profit!



This "tell-all" booklet is FREE!

Write Dept. F 81-80 for your copy

RUNDUM
MARK

offers ALL abrasive products...to give you the proper ONE

By EDWIN BREMER

Foundry DEVELOPMENTS

WORK by Morrogh on use of cerium to "neutralize" the effects of certain subversive elements which interfere with the production of nodular iron when magnesium is employed as the nodularizing agent, may be a partial answer to its effectiveness in improving the properties of steel. Elements indicated by Morrogh and others include lead, tin, antimony, bismuth, arsenic; very small amounts could be present in steel as well as cast iron which, under certain conditions, could affect the properties of steel adversely. Hence, the "neutralizing" effect of cerium—as well as its strong affinity for oxygen, sulphur, hydrogen and nitrogen, and ability to decompose silicates—may be the reason for the beneficial effects in steel.

* * *

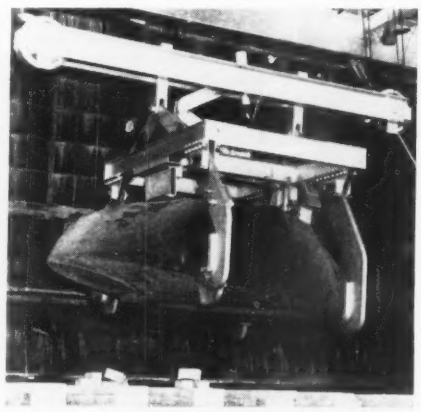
ACCORDING to an investigation by E. T. Myskowski, H. F. Bishop and W. S. Pellini, Naval Research Laboratory, Washington, and reported at the recent meeting of the American Foundrymen's Society the length of steel plate and bar castings which can be made sound by application of adequate steel chills for aiding directional solidification follows the empirical rules given by these formulas: D (distance in in. for plates) $= 4\frac{1}{2}T+2$ in., and D (distance in in. for bars) $= 6\sqrt{T}+T$; where T = casting thickness. Chills placed between risers promote soundness for a distance equal to 2D (1D in each riser direction).

* * *

AGREEMENT on six methods of testing steel and steel castings has been reached by a 13-nation technical committee which held a 4-day meeting at Columbia University, New York, as a part of the International Organization for Standardization. Twenty-three delegates from the national standards' bodies of the various countries participated, with H. A. R. Binney, British Standards Institution, as chairman. Test methods agreed upon by the committee are the Rockwell, Brinell and Vickers (diamond pyramid) tests for hardness, the bend test, and the Izod and Charpy impact tests. Tolerances and other phases of the tests will be developed later.

* * *

CAST steel turrets weighing 6 to 12 tons for new Army tanks are picked up automatically while still red hot, quenched in a 50,000-gallon water tank and then put on cars for reheating by ingenious new tongs designed especially for General Steel Castings Co., Eddystone, Pa., a major supplier of tank turrets to the



Philadelphia Ordnance District. Use of the tongs, made by Heppenstall Co., Pittsburgh, permits all operations of heating for hardening, quenching, tempering and requenching to be handled by remote control. This saves time and eliminates a potential hazard to workers.

* * *

INDUSTRIAL heating equipment with radio frequency output manufactured prior to July 1, 1947, may be operated through June 30, 1953, without certification under sections 18.21 or 18.22 of the Federal Communications Rules and Regulations. Reason for further postponement by FCC is that large numbers of old heating units are in use, and it would take a relatively large quantity of strategic materials to replace them with units of modern design. Also there is a shortage of measuring instruments needed to certify. However, users must conform to the rule that emissions on frequencies outside the allocated bands must not exceed a field intensity of 10 microvolts per meter at a distance of one mile from the heating equipment.

* * *

IN A paper entitled "Grain Refinement of Nonferrous Castings" presented at the annual meeting of the Institute of British Foundrymen in June, G. Swinyard mentions some work performed on admiralty gun metal (88-10-2) to develop a finer grain size. The author found that addition of 0.08 per cent P, with a pouring temperature of 2012° F, resulted in a finer grain size than without the addition. Further improvement was found with decrease of temperature to 1994° F. However, addition of 0.25 per cent Fe in addition to the 0.08 per cent P permitted use of a higher pouring temperature, 2084° F.

* * *

INDICATIVE of continuing interest in shell molding is a recent report of the development of resins for specific jobs where particular flow characteristics or sets are required; also for use on automatic equipment to eliminate hand dusting or patching before baking as well as providing a good bond and rapid setting. In addition, a mold lubricant has been developed which is claimed to require application only once every 20 molds.

* * *

FIRST report of Subcommittee TS 32 on Internal Stress in Castings, Institute of British Foundrymen, included the following tentative conclusions: (a) Temperature differences are an important cause of internal stress in castings. (b) Internal stresses in a casting which are balanced by compression of the mold at the moment of stripping, disappear when the sand is removed from the casting. It must be remembered that where the rigidity of the mold has caused plastic deformation of the casting, permanent stresses may result. (c) Stresses due to temperature-gradients in simple castings may be of a magnitude approaching the yield strength of the casting. (d) Residual internal stresses can exist only at relatively low temperature, i. e., at temperatures lower than that at which rapid creep under the stress concerned will occur. It is pointed out that these conclusions are based on studies of only a small number of castings of simple shape, and may well be modified by future work on larger castings of different shapes.

Let air give your production problems a lift

Let air power's tireless muscles do the heavy work in your foundry. Let *compressed air* be the force that lifts heavy castings . . . that puts molds where you want them . . . that opens or shuts chutes for molding sand . . . or numerous other applications.

You'll find Schrader Air Cylinders ideal for any application where you need straight-line forces for any distance from inches to feet . . . at forces from less than 20 pounds to over 5,000 pounds.

So, wherever you need quick, sure lifting, lowering, pushing or pulling—whether you want to tilt a furnace or position a mold—see how Schrader Air Cylinders and Operating Valves can help you do it better . . . faster.

We'll be glad to give you specific help for your foundry problems. Write, describing your installation, your idea—or fill out the coupon below.

Schrader
REG. U. S. PAT. OFF.

products
control the air

Air Cylinders • Operating Valves • Press & Shear Controls • Air Ejection Sets • Blow Guns • Air Line Couplers • Air Hose & Fittings • Hose Reels • Pressure Regulators & Oilers • Air Strainers • Hydraulic Gauges • Uniflare Tube Fittings

Mail This Coupon Today

A. SCHRADER'S SON
Division of Scovill Manufacturing Company, Incorporated
465 Vanderbilt Avenue, Brooklyn 17, N. Y., Dept. M-10

I am interested in more information on.....

Name_____ Title _____

Company _____

Address _____

Effect of Raw Materials on CUPOLA OPERATION

By BERNARD P. MULCAHY
President
Fuel Research Laboratory Inc.
Inidanapolis

It's important for the cupola operator to know the properties of the coke he is charging. Things to watch and what to do about them are detailed in this fifth of a series of articles

THE general properties of by-product coke, both physical and chemical, have been presented several times and most recently in the June and July, 1951 installments of the series on cupola operation in the FOUNDRY. This discussion therefore will elaborate on some of the coke properties which have been proved to affect operations to a noticeable extent.

First it must be remembered that coke plays a dual role in cupola operation, namely: 1. Furnishing heat for the melting of the stock, and 2. Controlling or adding carbon to the metal. Previous discussions have also pointed out how the other materials charged also influence these same factors.

Unfortunately, too much information regarding coke has been left at the theoretical levels, and the conclusions drawn have been totally erroneous, conflicting and confusing. This is partly due to the fact that it is very difficult to properly break down the effects noted and distribute the proportionate influence of the various components. In the assignment of coke's responsibility, however, it is highly essential that we know the degree of influence so that we can exert the utmost in control.

By-product cokes vary natively due to the coals (and inerts) used, the carbonizing temperature (and time) and their resultant physical properties. In many instances these variations are obscured by the manner of using the coke, resulting in little or no control.

Let's illustrate this with a few examples. Normal high-volatile coking coals contract when coked. This contraction results in a very dense, small-celled coke; also fissuring is extensive which, of course, produces small coke. On the other hand, low-volatile coals expand, producing lightweight coke, but of very firm structure. (These coals are not coked by themselves because of expansion.) The normal process of coking employs a mixture of the two types of coals, but no two producers use either the same coals or percentage of blends.

Another factor in coke production subject to variation between producers is that of temperature of carbonization.

Additionally, some foundry coke is produced with admixtures of "inerts" such as coke breeze, flue dust or anthracite fines. This is done to strengthen the coke.

And finally we have the additional factor of sizing or screening the coke produced.

These factors affect the character of the coke either singly or in combination to an extent that all of the use properties of the coke can be, or are, subject to variations.

It is neither necessary or possible for the average foundry to identify these native variations in coke. In the first place, the foundry producer does not change his practice radically from one period to another, so that the coke from a given source will generally retain its principal characteristics quite reliably. It is evident then that the problem of the foundry is to determine how a coke from one source differs in results from the other cokes used, and with a little study these characterizations of different cokes can be determined very practically.

Size — Previous articles have stressed the importance of coke size in connection with all cupola operations. We have also pointed out that size and strength are synonomous. This may sound confusing but it is actually so, and if so we need concern ourselves with size to have the most important single index in the physical characterizaton of coke.

To properly designate the size of coke we must reduce it to a practical basis. For example, a coke sized 4 x 5 in. would be described as one which would all pass through a 5 x 5-in. screen but be retained on a 4 x 4-in. screen. If this were true we could then actually call this coke a 4 x 5-in. size. If, on the other hand, we purchased a nominal 4 x 5-in. coke, we have no knowledge of what the average size of this coke was when we used it.

Let us illustrate the above by a simple table:

NOMINAL SIZE ALL 4 x 5 in.

	No. 1	No. 2	No. 3
% Retained on 4-in. screen	100	80	60
% Through 4-in. screen	0	20	40

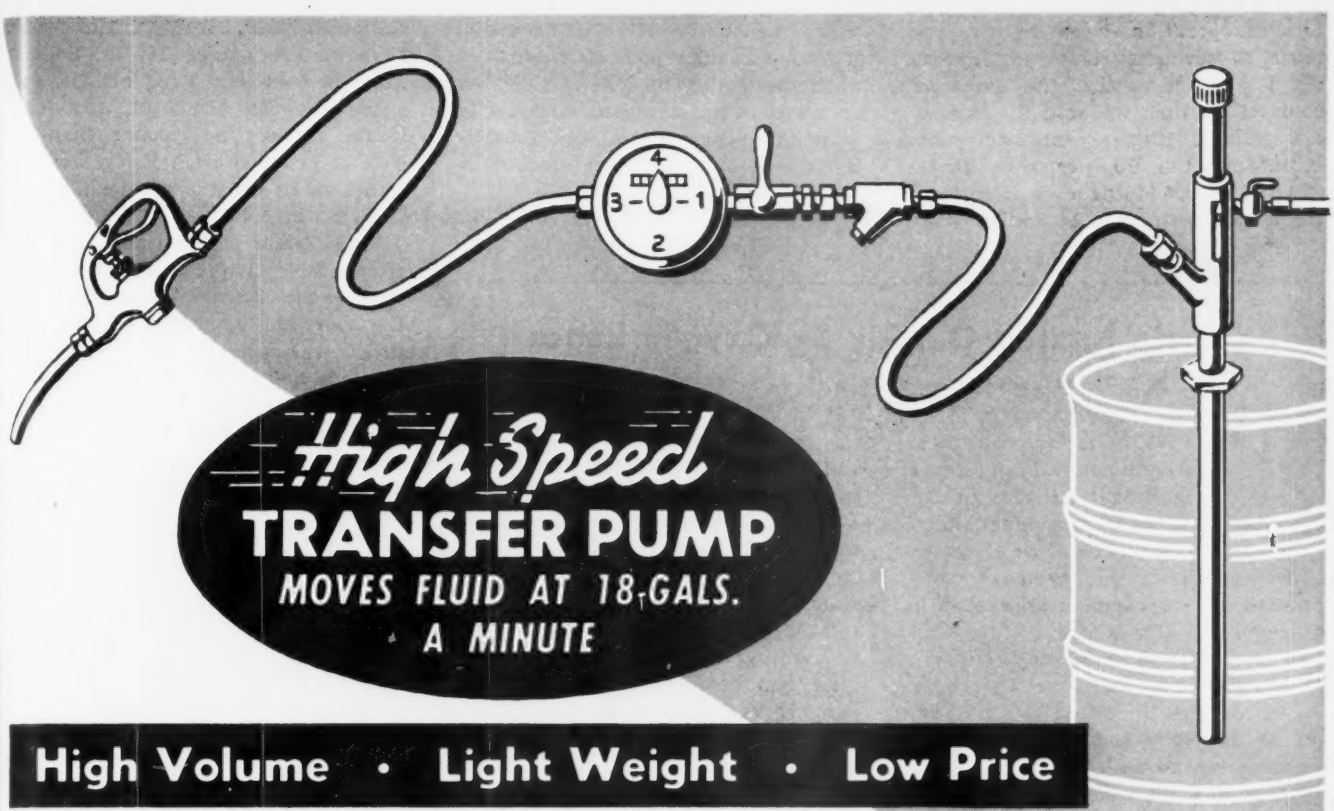
No. 1 coke is a true 4 x 5-in. size. No. 2 coke would be classed as a good commercial 4 x 5-in. size. No. 3 coke would be classed as a poorly sized 4 x 5 in. Nos. 2 and 3 cokes are those generally encountered in actual practice, and therefore concern us directly.

It is possible to receive No. 2 coke but to degrade it into No. 3 by poor handling at the foundry, and it is also possible to receive No. 3 coke even with proper handling.

No. 3 coke above is obviously the poorest coke, and its use can have an adverse effect on metal temperature, melting rate, coke and metal composition. But it is within the province of the foundry to correct this feature by the simple process of re-screening the coke before use. For example, a 3-in. screen would probably recover the size of this coke to around 90 per cent of its original commercial size, and the important point is this could be accomplished without any appreciable loss in coke or, to say it another way, without purchasing additional coke.

To concretely illustrate the effect of fines in coke let us take the 100 per cent 4 x 5-in. coke and add 10 per cent of —1-in. to it. This is a synthetic combination of sizes, but it will serve to show what happens. The —1-in. coke is sufficient to plug most of the voids in the 4 x 5-in. coke to the extent that, if used in this manner, it would probably require 25 per cent more coke to produce the metal temperature and carbons desired. Melting rates would be down. If we reverse the process and remove the fines we will, of course, reduce the total amount of coke used and simultaneously improve all fac-

(*Continued on page* 148)



High Speed TRANSFER PUMP

MOVES FLUID AT 18 GALS. A MINUTE

High Volume • Light Weight • Low Price

WILKINSON PUMP and METER SYSTEM

Core Oil Direct from Drum to Sand Mixer

- Eliminates waste resulting in the transfer of core oil from original container to sand mixer.
- Saves time consumed in delivering oil to the point of use.
- Meters quantity desired which results in uniformity of core oil delivered to mixer.
- Positive shut-off valve controls entire system, which means simplicity in operation.
- Encourages good housekeeping by avoiding spillage and waste.
- Eliminates hazards through careful handling of material.
- Low cost — it will pay for itself in a matter of a few months.
- NO AIR ENTERS DRUM OR CORE OIL.

The high volume that the new High Speed WILKINSON pump handles is really amazing! The pump weighs only 15 lbs., which makes it very easy to handle. A man can lift it in one hand with scarcely any effort. This air-operated pump not only pumps fluids and semi-fluids out of their original containers at an unusually high rate of speed, but it is also EXCEPTIONALLY LOW PRICED! Fits all drums with 2-inch openings, and includes an adjustable bung hole adapter, a spout with a hook, and an air valve for speed control.

.ESSD.
PRODUCTS FOR THE FOUNDRY
SINCE • 1874

The S. OBERMAYER Co.

Everything you need in your Foundry

647 EVANS ST.
CINCINNATI 4, OHIO

2563 WEST 18th ST.
CHICAGO 8, ILL.

33rd AND A. V. RAILROAD
PITTSBURGH 1, PA.

(*Continued from page* 146)

tors of operation. Note that we remove 10 per cent (discard if necessary) but decrease the amount charged so that we actually have a net gain of 15 per cent even with discarding the 10 per cent fines. This is not as fantastic as it sounds, for it has been done in actual practice many times in the foundry.

The reason for detailed discussion of this particular point is that, even when the quality of coke is poor, the foundryman has a means of not only using this poor material, but actually can use it effectively and economically.

In judging the size of coke we must not be misled by averages. For example, a coke sized 6 x 1 in. would have an average of 3½ in. So also would a coke 4 x 3 in., but the void space between the 4 x 3-in. coke would actually be greater than the 6 x 1-in. coke, which, of course, would mean greater permeability for the 4 x 3-in. coke.

This factor of permeability has considerable importance, particularly for the larger diameter cupola. Generally the operators of 72-in. cupolas will specify 6-in. coke, but through normal handling and abuse this coke will contain at least 25 per cent less than 4 in. by the time of charging. This amount of breakage will result in at least 25 per cent more coke actually being required than if it were properly sized.

Carbon control on large cupolas is always difficult, and when the coke contains appreciable fines it aggravates this problem considerably. The greater distance the wind must travel to reach the center of the coke bed is an initial disadvantage, and if the voids are plugged with small coke, a greater proportion of the air is forced to the side (path of least resistance), thereby short-circuiting the center area. Melting is then confined to the outer annular ring, decreasing the effective melting area and also concentrating the flow of gases to the extent of creating a state of oxidation.

This discussion of size applies to all cupola cokes regardless of origin, and to all cupolas. Re-screening the coke is possible for all foundries and offers them a ready means of improving any coke, and in most cases with a direct financial saving, including and beyond the installation cost of the screen.

Inherent Combustion Properties—This reference is to factors or characteristics of coke which affect its native burning properties beyond the question of size—that is, the burning rate of a bed of coke is a function of the voids between the pieces for the entire bed and also the inherent combustibility of the coke (carbon) piece as an individual.

Primarily the burning rate of the bed is dependent on the ability of the air and combustion gases to penetrate and diffuse through the entire bed. This has been discussed in the previous section. The second factor, which follows close on the heels of permeability, is the rate at which the individual pieces will react with either oxygen or carbon dioxide. Actually, the rates of reaction of these two gases parallel each other or, in other words, these two reactions are apparently a function of the same basic causes.

(*Concluded on page* 153)

Cupola Ignited Quickly by Oxygen Lance

By R. O. DAY, *Development Engineer,* Linde Air Products Co.
Division of Union Carbide & Carbon Corp., New York

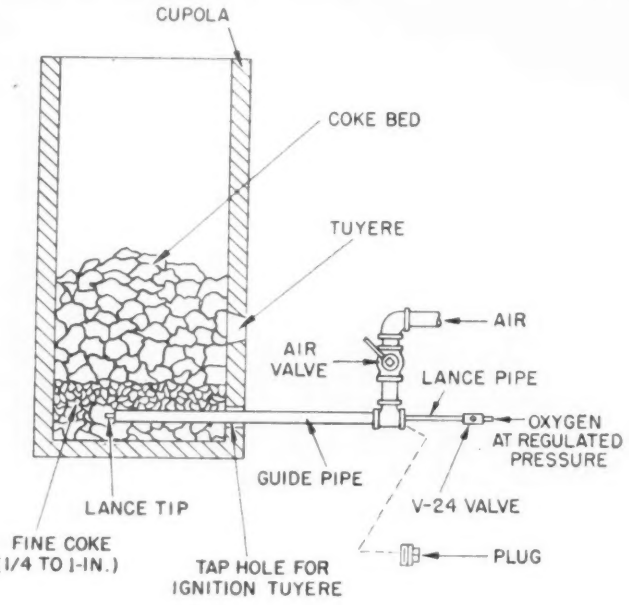
AN OXYGEN lance provides a simple, economical, and rapid tool for igniting coke beds in cupolas. With a consumable lance, ignition time is reduced to a matter of seconds and no expensive, cumbersome, or complex apparatus is required.

No special skill or extensive training is needed to operate a lance. The tip of a ¼- or ⅜-in. ID lance pipe is heated to ignition temperature with an oxy-acetylene blowpipe or other suitable heat source. The oxygen valve is "cracked" and the lance is quickly inserted through a guide pipe that leads to the coke bed. Oxygen is then turned on to a flow of about 40 cu ft per minute, causing the lance pipe to burn at high temperature.

As soon as the coke is ignited, the lance pipe is withdrawn and the oxygen is turned off. Compressed air is then directed through the guide pipe to fan the ignited coke and spread the ignition zone. As ignition spreads, the guide pipe is gradually withdrawn, and when ignition is fully underway, compressed air is turned off and the guide pipe is removed from the cupola.

There is no fuel smoke with the oxygen ignitor since no wood, gas, or oil is needed for ignition. Operating costs are reduced as a result of eliminating fuel handling, preparation and storage.

As can be seen in the accompanying sketch, the ignitor apparatus is of simple design. All that is required is a 1-in. ID guide pipe, ¼- or ⅜-in. ID lance pipe, an oxygen valve (an Oxweld V-24 valve is recommended) with suitable piping, a guide pipe plug with peep hole, and an adequate supply of oxygen with regulator and hose.



The oxygen lance is a flexible tool too, in that it can be used for oxygen enrichment of electric furnaces and for scrap cutting. When used for cupola coke ignition, only a few trial runs are necessary to determine time, oxygen and lance requirements for each cupola. Satisfactory ignition of fine coke has been obtained in 15 seconds with this type ignitor.

LONGER LASTING

PERFORMANCE

costs you nothing extra when you buy

Stevens

Stamped Steel Ladle Bowls

Longer lasting performance is a *value beyond purchase price*, which has always identified Stevens Stamped Steel Ladle Bowls as the most economical you can buy.

Unlike any similar product, Stevens ladle bowls are deep drawn from single sheets of specially selected steel, to provide a "built-in" value of extra strength and durability—to insure *extra-long* service life. Stevens Stamped Steel Ladle Bowls can save you many maintenance, repair and replacement dollars—cost no more than you might pay for an ordinary bowl. Proof? You'll find it in the purchase.

STEVENS COMPLETE LADLE EQUIPMENT LINE INCLUDES

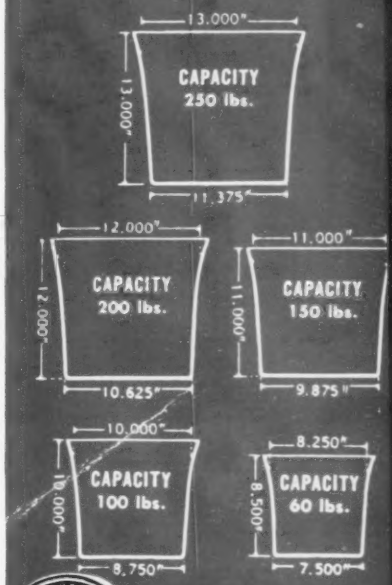
- BUGGY LADLES
- CRANE LADLES
- MIXING LADLES
- TROLLEY LADLES
- WORM-GEARED LADLES

TYPES, SIZES AND CAPACITIES TO MEET EVERY NEED

STEVENS ROUND BOTTOM STAMPED STEEL LADLE BOWLS ARE IDEAL FOR FLAT STREAM POURING

Style "S" 60 lbs. capacity
Style 108 50 lbs. capacity

STEVENS FLAT BOTTOM STAMPED STEEL LADLE BOWLS ARE SIZED AND PRICED "RIGHT"



"EVERYTHING FOR A FOUNDRY"
TRADEMARK

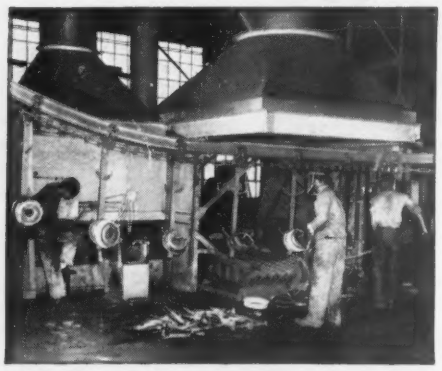
FREDERIC B. STEVENS INCORPORATED

BUFFALO · CHICAGO · CLEVELAND
INDIANAPOLIS · NEW HAVEN
Representatives in Other Principal Cities

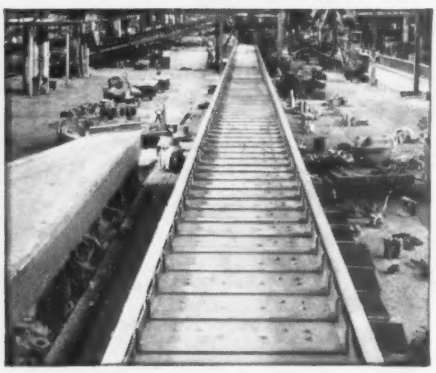
DETROIT 16, MICHIGAN

FREDERIC B. STEVENS OF CANADA, LTD.
WINDSOR · TORONTO
ONTARIO

Above: **Bartlett-Snow Apron Conveyor** Handling Castings from the Shakeout in a Large Production Foundry.



Shakeout in Large Southern Foundry Showing Dust Hood and Castings Handling.



Apron Conveyor in Cleaning and Inspection Departments in a Large Midwestern Malleable Foundry.

Castings Handling

stops profit leaks

● Bartlett-Snow castings handling and cleaning systems reduce the time—and cost—of handling castings from the shakeout to the shipping room. They permit the cleaning room and inspection operations to be synchronized to the tonnage passing over the shakeout — eliminate rehandling — and produce a controlled flow of castings, similar to the controlled flow of molding, pouring and cooling made possible with a run-around mold conveyor.

Complete facilities including casting coolers. The C. O. Bartlett & Snow Co., 6201 Harvard Ave. Cleveland 5, Ohio.

DESIGNERS ENGINEERS

BARTLETT-SNOW
CLEVELAND 5, OHIO

FABRICATORS ERECTORS

Increasing Productivity for People You Know

Get the Advantages of a *Really* PORTABLE MULLOR

(With spring-loaded mulling wheels since 1944)

Real Portability—only the sand need be moved . . . not the entire mullor. The Mulbaro provides real ease and convenience.

Sand Is Handled Only Once—that's when it is placed in the barrow for mulling. Mulled sand is moved to the molder or coremaker in the same barrow.

Knee-High Barrows for Easy Loading—no need to raise the sand to a waist-high crib opening. Barrows may be loaded from any side or from overhead bin or hopper.

Use Two or More Barrows With One Mulbaro—when a batch is mulled, move the barrow out and move a second into mulling position. Then, mull the second batch while the first is moved to molding floor or core bench.

Short Time Cycles, Real Mulling Efficiency—only the Mulbaro offers modern mullor design in a portable machine. Light-weight, rubber-tired, spring-loaded mulling wheels; high-agitation plow design, and hemispherically shaped barrow bowl insure complete mulling of core or molding sand in short time cycles.

The MULBARO

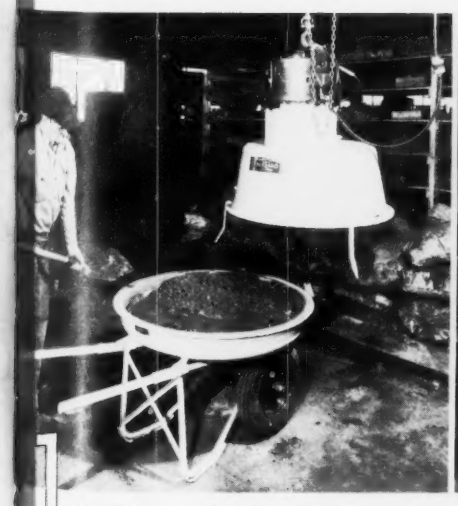
Write today for complete information!

BEARDSLEY & PIPER
Div. Pettibone Mulliken Corp.
2424 N. Cicero Ave.
Chicago 39, Illinois

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

B&P

LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS



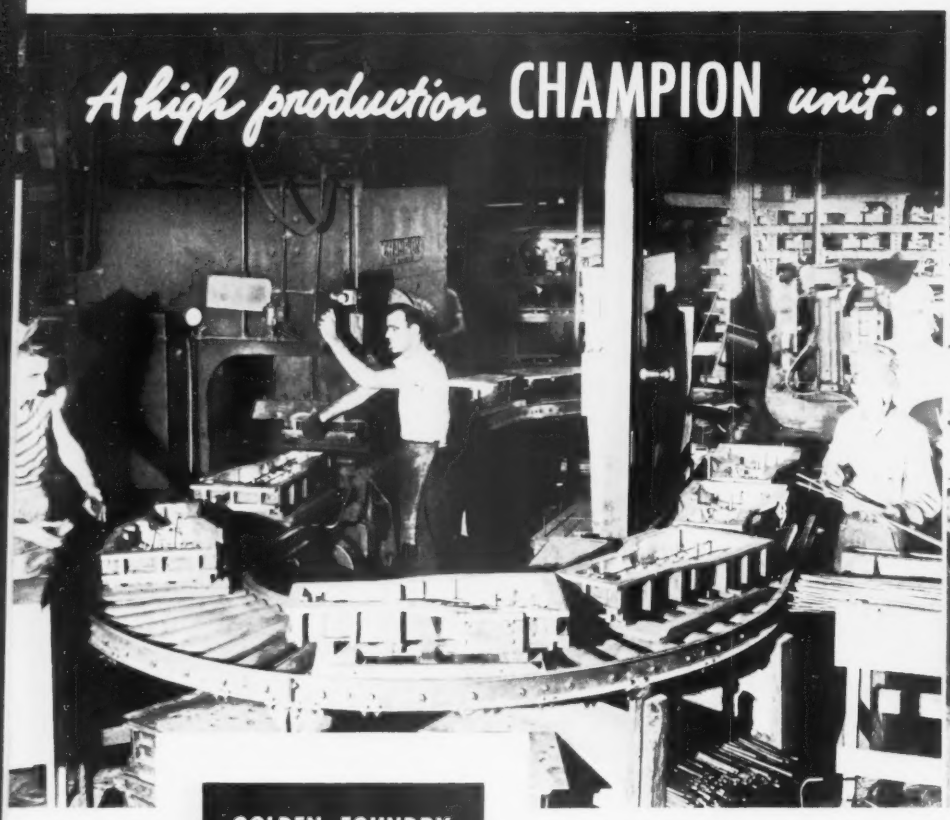
1 The Mulbaro couldn't be easier to operate. Just load the knee-high barrow from heap or overhead storage bin . . . the sand need be handled only once.

2 Lower the mulling mechanism, turn on the machine . . . and the mulling is completed in four minutes or less.

3 Move the barrow with the batch of mulled sand to any location in the foundry. No time wasted in loading and unloading!

INCREASE PRO

A high production CHAMPION unit. . . with a J&J ROLLOVER in



GOLDEN FOUNDRY of Columbus, Ind., has found today's answer to higher production, quality, and economy with Beardsley & Piper equipment!

A high-production Champion CB-400 Core Blower produces up to 180 fifty-pound diesel engine barrel cores per hour. Other coremaking jobs are handled with comparable efficiency.

A Johnston & Jennings Rollover machine was chosen for this high-production unit after a careful study of all rollover machines on the market. The J&J Rollover cycle was found to be the fastest and—once installed—it proved itself on the job.

Write today for complete information!

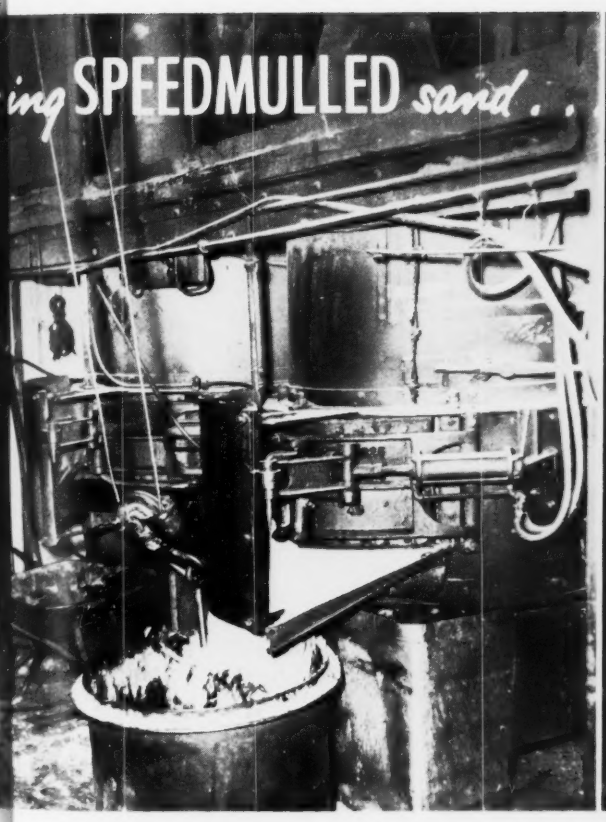
BEARDSLEY & PIPER
Div. Pettibone Mulliken Corp.

2424 N. Cicero Ave., Chicago 39, Illinois

...DUCTION NOW—

as Golden Foundry did!

...ER ...ing SPEEDMULLED sand . .



Two Model "40" Speedmullors provide all the mulled core sand. Installation of these Speedmullors followed successful use of other Speedmullors in the plant. A Model "80" has also been recently installed with a new molding unit.

makes cores for SLINGER *rammed molds*

To keep pace with the high-production coremaking unit, Golden uses a Tractor Sandslinger to ram large molds. Here is another progressive foundry that's thoroughly sold on B&P machines.

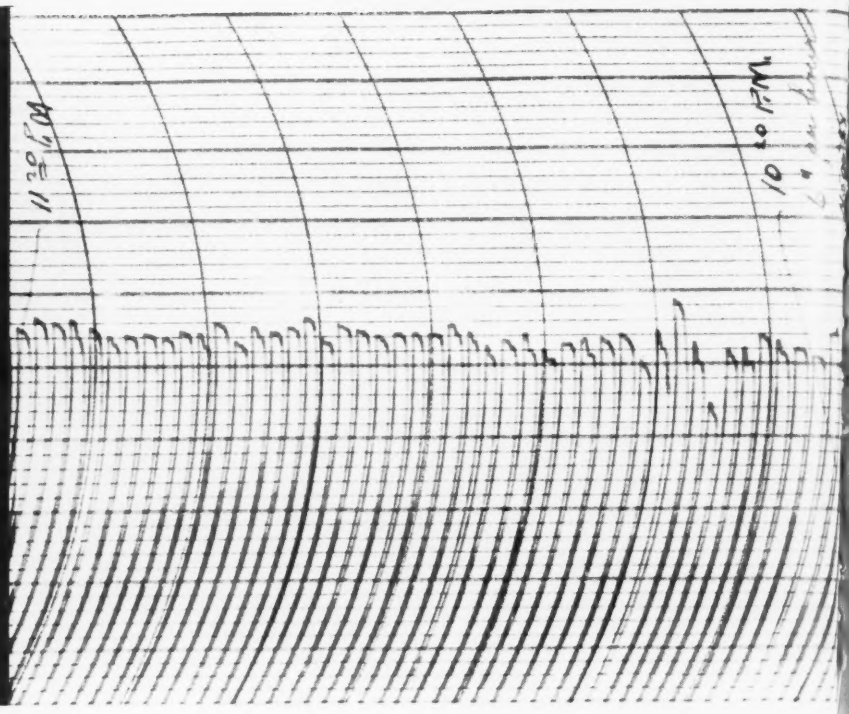
LOOK TO

BEARDSLEY & PIPER

FOR BETTER METHODS

An actual record of one hour's operation of a typical manually controlled Model "80" Speedmullor. Fifty 1-ton batches of synthetic molding sand were loaded, mulled to maximum physical properties, and discharged in this period.

Batch after Batch...



... A CONTINUOUS SUPPLY OF COMPLETELY MULLED SAND ...

WITH A SPEEDMULLOR

Only in the Speedmullor are accurate control and complete mulling of batch type operation combined with the advantages of high-speed mulling. Other mullers may claim fast time cycles although they were designed for 5 or 10 minute operation, but only the Speedmullor was designed and built to provide high-speed, thorough mulling. For maximum development of physical properties, total Speedmullor time cycles vary from 1 to 1½ minutes depending on the type of sand mulled. Thus, batch after batch of completely mulled sand is discharged so fast that practically a continuous supply of sand is available for high production foundry molding and core making.

Write today for a Speedmullor Catalog!

BEARDSLEY & PIPER, Div. of Pettibone Mulliken Corp., 2424 N. Cicero Avenue, Chicago 39, Ill.

Manufacturers of the Sandslinger • Speedslinger • Hydra-Slinger • Speedmullor • Mulbaro • Screenarator • Nite-Gang • Junior Nite-Garg • Preparator • Magnarator • B&P Combination Units • Roto-Mold • Roto-Feed • Gyra-Screen • and the entire Champion line of: Core Blowers • Blo-Matic Core Blowers • Rol-a-Cor • Speed-Draw • Molding Machines • Electric Riddles.

B&P

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

LOOK TO BEARDSLEY & PIPER FOR BETTER METHODS

(*Concluded from page* 148)

Earlier mention was made of current opinions based on primary theoretics of combustion. We have here direct evidence that the error in the conclusions drawn lies in neglecting the tremendous difference in the reaction rates involved and that laboratory techniques have been the source of the basic information.

The item of contention lies in the statement that the difference in reactive rates of coke disappears at the extreme temperatures of combustion actually encountered. Under test conditions this has been shown to be true, but we do not have these same conditions within the cupola.

To show how completely erroneous is the statement that we need not be concerned with the reactivity of coke we will illustrate with an example that almost every foundry has encountered many times in its operation.

Green Coke Not Suitable

"Green" coke is a term referring to a coke containing a high percentage of residual volatile matter. It is characterized by large, dark pieces rather "punky" in structure. It is large because it does not have the usual number of fissures, and because of this also it is tough and does not break easily on impact. The average size of such coke is larger than usual. This size gives maximum permeability to a bed of coke and therefore (usually) ideal distribution of gases.

When such a coke is used, what happens? With no compensation we will produce oxidized iron, low carbons (and silicon), loss of metal temperature and, eventually high coke costs. Why? Simply because the rate of combustion is so much faster than with the regular, completely carbonized coke that with the same amount of coke and air the bed coke burns down rapidly—so fast that free oxygen reaches the melting iron, and oxidation results.

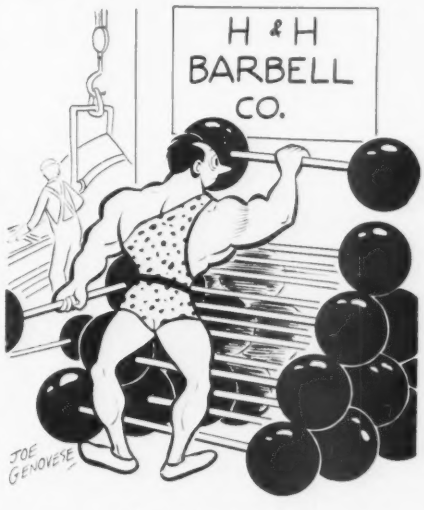
But the above is only part of what takes place. Loss of bed, of course, ultimately results in lower metal temperatures, even while using normal quantities of coke, so that without going any further we know that our thermal efficiency has dropped. The effect of the reactive coke, however, continues beyond the melting zone, and into the stock column where the carbon dioxide reverts to carbon monoxide with additional loss of heat and a further depression of thermal efficiency.

Curiously, this same coke has a greater carbon solubility than the regular coke because of its higher reactivity, but to permit it to function in this manner—and of even greater importance to avoid oxidation and loss of metal temperature—it is necessary to make some changes in the amount of coke used and the air rate. Here again we have direct evidence of the difference in combustibility.

Such a coke will actually burn with less cubic feet of air per pound of coke, and a re-balancing of conditions is obtained by raising the initial coke bed (possibly 5-10 in.) and increasing the coke per charge by approximately 10 per cent. If oxidation (and low carbons) persist, drop the air rate possibly 5-10 per cent or until a balance is effected. Melting rates will decrease but metal temperatures will be improved and oxidation will be eliminated.

A little study of the coke received from time to time will permit the identification of "green" coke. The coke is generally larger, with black ends (inner) and the coke is softer, i. e. more abradable. When such coke is received the above adjustments will permit its use, or, if other coke is available, a mixture of the two will decrease the effect of the "off" grade.

Coke from Oxidized Coals—During periods of stress for coke plants such as coal strikes, etc. where regular deliveries of coal are reduced or prevented entirely, increased quantities of stock coal may have to be used. The effect on the coke is proportional to the percentage of stock coal used and the degree of its age. Badly oxidized coal produces a "punky" coke, or, in other words, an agglomerated structure is present; the coal did not fuse and bubble to produce a normal cellular structure, but the particles partly fused and stuck together. This coke does not burn properly and requires a greater amount of air to produce effective temperatures. Carbon solubility is also low.



Materials Handling

Coke of this character may require more coke per charge and higher air rates in order to use it properly. Where the coke is in the advanced stage of oxidation (of coal) it may be necessary to adjust the metal charge to compensate for the lower carbon absorption.

The above examples of coke difficulty have been discussed individually in order to illustrate, the fundamental corrections necessary, but it must be remembered that a combination of these factors may occur which will require a balanced correction.

It is well worth the foundry operator's time to study and catalogue the different cokes received so that when the occasion arises corrections in operations can be made prior to letting the quality of the iron get completely out of hand.

Such comparative studies can be made by arranging for several days operation on each coke by itself, making the adjustments necessary to determine whether each coke requires more or less air, more or less coke and the optimum initial bed heights.

Favor Low-Ash Coke

Cokes with high ash content are generally slower in combustion than low-ash cokes. Additionally, these same cokes have a greater tendency to fissuring. These should be treated as previously mentioned.

Little correction can be applied to high-sulphur cokes, other than the usual methods of soda ash treatment or the careful selection of low-sulphur metal stock. Normal coke with sulphur contents of around 0.80 per cent will contribute about 0.04 per cent sulphur to the iron when used in regular amounts. Excess coke will raise this amount.

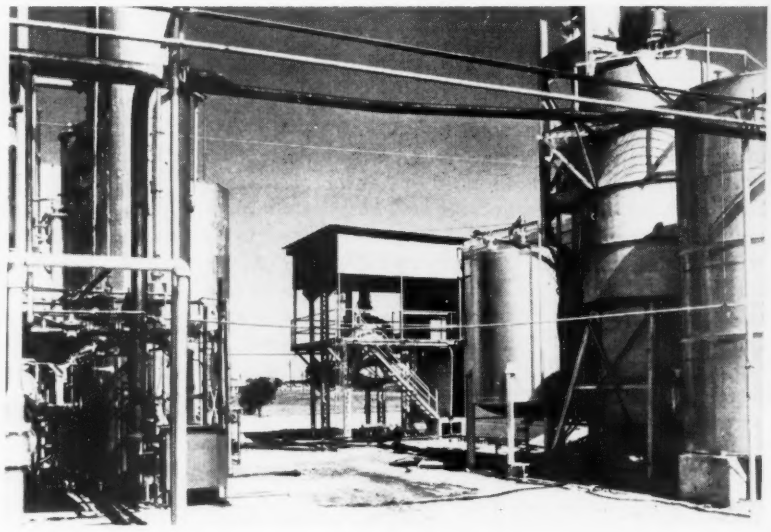
In concluding this section on by-product coke it must always be remembered that the use of any coke, regardless of kind or source, is subject to two principal adjustments, namely, the amount of coke used (both bed and charge) and the amount of air. Either one or both of these factors can be used to set the amount of air per pound of coke burned per unit of time. This balance determines the state of oxidation created and directly affects the rate of carbon absorption.

It has been stated repeatedly that the most difficult problem encountered by the cupola operator in time of distress supply of good materials is that of maintaining proper carbon levels, and the principles outlined here should first be applied before resorting to carbon additives. If this is done it will be found in many cases that no additives are required.

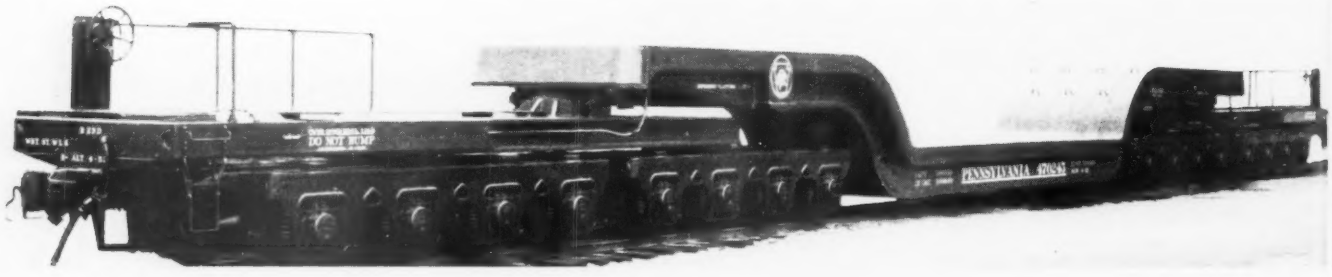
NEWS VIEWS

TANKS ROLLING: The Army recently took the wraps off its newest medium tank, the long-secret Patton 48. Shown here are the tanks rolling off the assembly line at the Chrysler Delaware Tank Plant, Newark, Del. Of low silhouette with sloping elliptical sides, the tank features for the first time a one-piece cast hull as well as a one-piece cast steel turret.

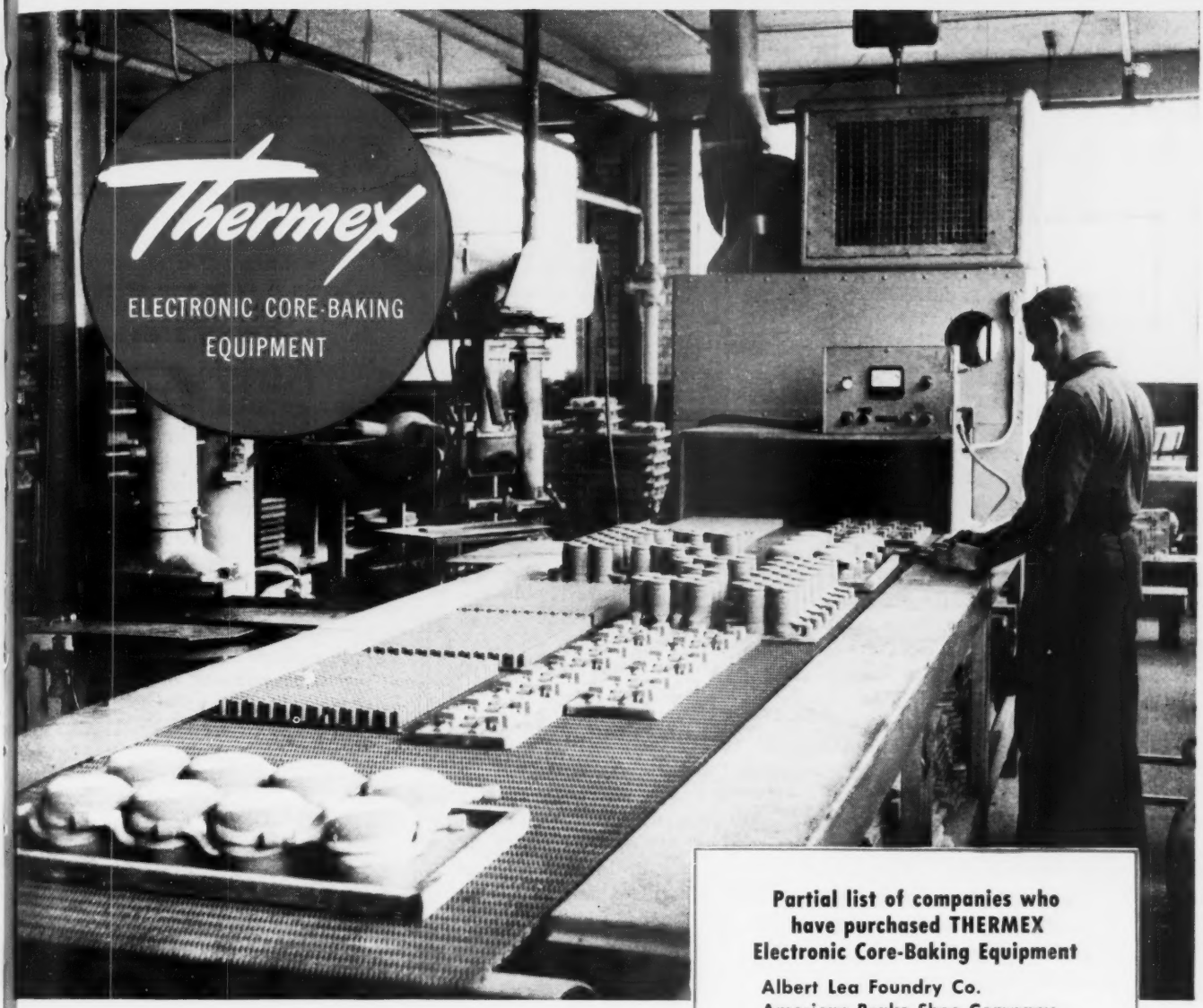
MORE CAPACITY: Lindberg Engineering Co., Chicago, has opened Plant No. 2 at 2317 Grand Ave. It will provide additional capacity for manufacture of laboratory furnaces, small induction heating units, melting furnaces and atmosphere generators. A partial view of one of the departments for small furnaces is seen here.



FOUNDRY CHEMICALS: Principal units of a new million-dollar chemical plant just completed by the Borden Co. at Demopolis, Ala., are shown here. The first of its type to be built in the Southeast, its output of synthetic resins and other chemical products will go to the foundry, plastics, paper, textile and woodworking industries of the area.



SUPER CAR: What is said to be the largest and strongest freight car ever built was recently completed by the Pennsylvania railroad at its Altoona, Pa., works. It is intended to carry extra heavy industrial loads, such as large castings, weighing up to 250 tons. The car is more than 124 feet long, has 32 wheels arranged in four 8-wheel roller bearing trucks, and weighs more than 500 tons fully loaded.



Partial list of companies who have purchased THERMEX Electronic Core-Baking Equipment

Albert Lea Foundry Co.
American Brake Shoe Company
American Hardware Corporation
Atlantic Steel Castings Co.
Brugger Mfg. Company
James B. Clow & Sons
Crane Company
Drake Non-Clinkering Furnace Block Co., Inc.
Ford Motor Company
Fundicao Tupy
Grand Haven Brass Foundry
Grinnell Corporation
International Harvester Co., Ltd.
Moline Malleable Iron Company
Mueller Company
National Malleable & Steel Castings Company
Ontario Malleable Iron Co., Ltd.
Phoenix Brass Fittings Corp.
Rolle Manufacturing Company, Inc.
Ronci Co., Inc.
Sterling-Faucet Company
U. S. Pipe & Foundry Company
Walworth Company

Here's the proven way to cut core-baking costs!

SPECTACULAR SAVINGS reported by users of THERMEX® Core-baking Equipment result from these advantages:

- ★ core-baking time cut from hours to minutes—reducing scheduling, handling, and labor cost drastically.
- ★ greatly improved quality of cores—reducing number of rejects.
- ★ efficient conveyorized handling of production reduces floor space requirements.
- ★ dielectric heating reduces overall utility costs.

A Thermex field engineer will be glad to show you proof of savings based on verified cost studies of installations. Take advantage of this cost-cutting, labor-saving equipment now. Write The Girdler Corp., Thermex Division, Louisville 1, Kentucky.

The **GIRDLER** Corporation

THERMEX DIVISION

Adventures of BILL

By PAT DWYER
Illustrations by RICHEY

IF SUCH a thing was possible," I said to Bill, "do you know where I should like to be at this precise, identical minute? Wishing won't get me there, but I find that even contemplation of the idea furnishes a small measure of relief from the heat wave which—to quote from the original and inspired reporters—has prostrated our fair city during the past week."

Bill regarded me with lackluster eyes. Plainly he was not interested. He slowly removed the stogie from his lips, flicked the ash from the end with a slight dextrous movement of the little finger of the left hand, and then restored the stogie to its original position with the inner end firmly grasped between his teeth and the outer end cocked at a belligerent or impudent angle. The modern equivalent of the old knightly motto: "I'm a peaceful guy, but don't tread on the tail of my coat."

Quoting entirely from memory, it is possible I have two eras mixed, but you get the general idea, ready—and willing—for either peace or war.

"Well," I said, "what about it?"

"What about what?"

"For the benefit of the gent who apparently has been asleep or in a state of coma—suspended physical and mental animation due to the heat—I shall repeat my question. Do you know where—"

"I heard you the first time and the answer is NO. I don't know where you would like to be at the present moment. Since there isn't the slightest chance of having your wish granted, what's the use of talking about it? I can tell you where silly question askers should go, but you probably would not accept the advice, so there y'are as the feller says, the whole bloomin' kettle o' fish in a nutshell!"

"Your complete and courteous reply to my inquiry of even date received and highly appreciated. However, it is no more and, on the other hand, it is no less than I expected. Greatly encouraged by the intense interest you display in the subject, I now shall unfold the proposition in detail. I rather imagine it will appeal to you. In fact, I shall not be surprised to find you covered with envy, chagrin and—er—one thing and another, because the idea did not occur to you. These flashes of inspiration come only to the mentally alert, to those who keep their eyes open; in a word, to those who are not constantly asleep at the switch. Are you lis'nen?"

"Oh, for heaven's sake," Bill replied wearily. "Go ahead and spill it before it turns sour on you. However, if your drooling falls on barren ground don't say I did not try to stop you."

"If I had my wish at the present moment," I said, "I should like to be crossing the harbor ice down home about the middle of January, with snow up to my knees and with a stinging northeast gale whistling in from the broad Atlantic. Well fed, amply clad, bubbling over with reserve energy, every nerve and muscle keyed to concert pitch, I can see myself bounding across the 5-mile stretch like a whippet after a mechanical rabbit, or a hobo molder after he heard the quitting whistle in the wicked old saloon days."

"Bounding across the ice like a whippet. Ha, ha! You should send that one in to the fella who collects the best similes for the year. Send your picture with it, a full length profile. At an extremely remote period, it may be you bore some slight resemblance to one of these here now racing dogs, but, believe you me, kid, the old gray whippet ain't what she used to be. Now, if you had said a hippopotamus, or a beer keg, or even a little round apple dumpling, I could recognize the analogy. Are you sure you were not thinking of a penguin?"

"One of these hardy birds might make the trip under the conditions outlined. You would have just about as much chance as you would have of resembling a whippet. You might waddle and creep for half a mile, then, overcome by cold and fatigue, you would collapse in great agony and congeal into a ball of ice, another vain sacrifice on the altar of ignorance and good intentions."

"Ignoring for the moment," I interrupted, "your scurrilous reference to the appearance of a certain person I always have held in the highest esteem, I should like to have you authority for the statement that frozen people die in great agony. Consensus of oral and written opinion is that death by freezing is painless, in fact, that it is rather pleasant."

"Well," said Bill, "since you ask me I'll tell you. I have the highest possible authority for the statement

(Continued on page 158)

Fortunately the interview was held close to a life saving station

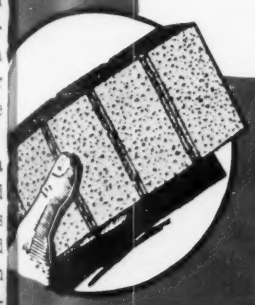
Famous CORNELL CUPOLA FLUX

Two sides to this story - both are true!

Conditions Iron for BETTER CASTINGS

- Purges molten iron of impurities.
- Makes it more fluid.
- Reduces sulphur.
- Keeps slag fluid.

Castings are cleaner, sounder and easier to machine.



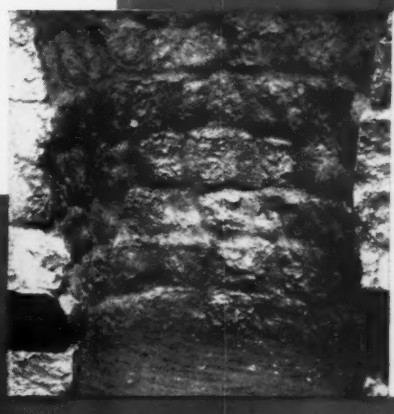
Keeps Cupolas Cleaner

GREATLY REDUCES DOWN TIME AND MAINTENANCE.

- Bridging over is practically eliminated.
- Drops are cleaner.
- Brick or stone linings last longer.

Due to its formation of a glazed or vitrified surface on cupola lining, Famous Cornell Cupola Flux reduces erosion, patching and replacement.

THE CUPOLA before using Famous Cornell Cupola Flux



THE CUPOLA during use of Famous Cornell Cupola Flux.

FOR PROOF ask Leading Gray Iron Foundries or Malleable Foundries with cupolas.

WRITE FOR BULLETIN NO. 46-B.

The Cleveland Flux Co.

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS CORNELL FLUXES

Trade Mark Registered

BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

(*Continued from page* 156)
and that is my own."

"Very interesting," I admitted, "but slightly indefinite. Where and when were you frozen to death? If more than once give date and locality. Is it a family trait, and if so does it follow the male or the female branch? Any attempt ever made to restore animation? Why?"

"I never actually was frozen to the point where life became extinct, but I have been within whispering distance of it more than once. Without exception, I think the frozen gate the most painful of all the gates leading to the promised land.

"Down in the old town you were talking about a few minutes ago I met a lad one night who almost pushed me through the gate. The night was bitterly cold and I was hurrying home—every person walked in those days—when this lad hailed me after the manner of what's-his-name the Ancient Mariner. He had no tale to tell, but he held certain views on the subject of elocution and the art of public speaking. He wanted to give me the benefit of his opinion.

"Like his famous prototype, he was troubled by spirits, but his spirits were inside and rendered him immune to the biting cold that rapidly was converting me into an icicle. The air was cold and still, one of those nights when the sleigh runners screech on the snow, the trees crack with the frost and cold penetrates through clothes and flesh and seems to congeal the very marrow in your bones.

"His pet grievance was the decadence of the gesture. Would I believe him when he told me he had attended a smoker that very evening where a fella had recited that sterling composition "Napoleon and The Young British Sailor," and kept his hands in his pockets all the time he was doing it? Terrible, simply terrible. Appropriate gesturing with the hands and suitable posturing with the head and other parts of the body are absolutely essential to the proper presentation of this or any other composition.

"I agreed with him heartily. He had the right idea and I would be glad to take the subject up with him again. If he would excuse me I would be pushing along. English sailors have hearts of oak, and presumably are immune to frost bite. I was not sure about my heart, but basing my opinion on the condition of my feet and hands I was morally certain that if I remained there much longer my heart would be a lump of ice.

"He hastily assured me he would keep me only a minute. Just a minute while he showed me how "Napoleon and the Young British Sailor" should be done by a guy as knowed how it should be done. I have laughed many times since at the recollection of that exhibition. He was a long, lank, funny looking gink anyhow and his gesturing and posturing were about the most ludicrous and grotesque I ever have seen. Of

(*Concluded on page* 162)

AIRPLANE WING SECTION CAST

In One Piece of Magnesium

SUBSTANTIAL progress has been made in a research project sponsored by the U. S. Air Force to produce cast magnesium aircraft wings, it has been disclosed by Northrop Aircraft Inc., Hawthorne, Calif.

A section of an airplane wing 16 feet long and adhering to exacting tolerances already has been cast from AZ-92 magnesium alloy. The casting is believed to be the largest cast aircraft surface ever produced.

Unusual significance is attached to the wing casting project since it is believed that cast wings can be produced much more rapidly and economically than can conventional aircraft wings fabricated by attaching aluminum skins to spars and ribs by riveting or spotwelding.

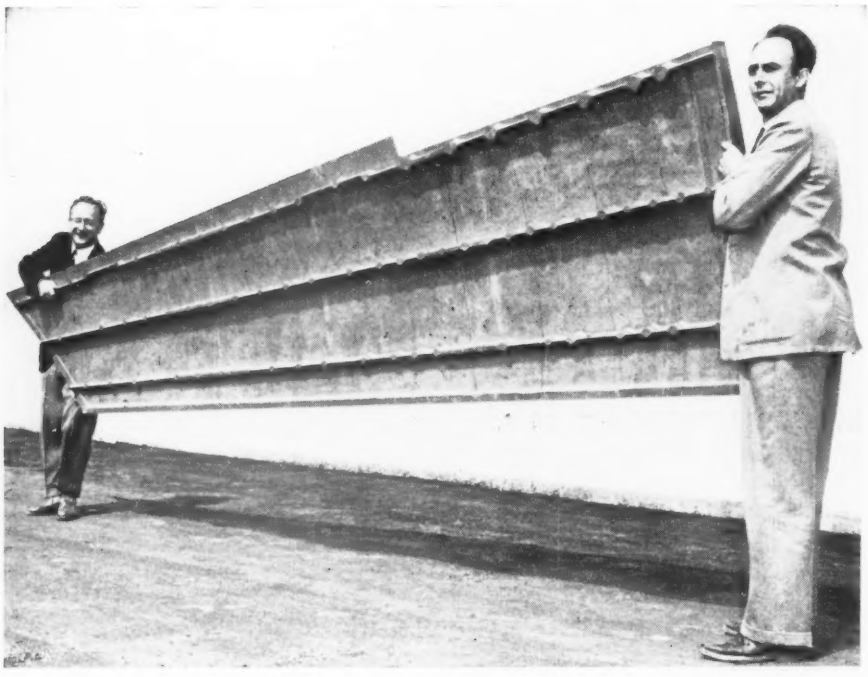
The initial experimental casting was produced through the joint efforts of Northrop engineers and the Aluminum Co. of America at Alcoa's Vernon, Calif., foundry. Northrop employed Alcoa facilities under subcontract for the project.

Casting of aircraft surfaces, such as wings, is particularly difficult since tolerances and strength-weight requirements are so exacting. Considering its size, the wing section casting is extremely thin. In places it is only ¼-in. thick. Conforming to aircraft quality standards, the casting is free of visual faults.

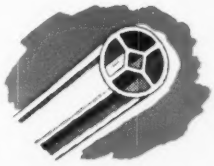
The techniques used in successfully producing the sample casting were evolved through extensive experimentation and development of numerous innovations in standard casting procedures. The casting methods have not been disclosed.

"Obtaining of this first experimental casting is most significant, but it should not create the impression the time has arrived when airplane wings can be cast in quantity," according to John K. Northrop, company president. "Much additional experimentation and testing must occur before this method of manufacture is ready for use in aircraft production."

The casting program has been directed by E. C. Denzin, Northrop special projects engineer. Assisting him have been Rebecca M. Smith, W. A. Steyer and Keith Finlay. Alcoa personnel who have participated actively in the project included A. E. Grandey, Vernon magnesium foundry superintendent, James Chamberlain, Frank Owens and Robert Sims.



Holding a 16-foot airplane wing section casting are W. A. Steyer, Northrop wing casting engineer, and L. L. Unmack, liaison engineer

Independent Fabricators rely on Kaiser Aluminum engineers for expert technical advice and engineering assistance on any aluminum casting or extrusion  problem. This service is immediately available to help you make better use of Kaiser Aluminum.

▶ Aluminum pig specification ingot, extrusion billets. Sales offices in principal cities. Kaiser Aluminum & Chemical Sales, Inc., Oakland, California.

Kaiser Aluminum

A major producer of aluminum pig, specification ingot and extrusion billets

HERE'S *Automatic*

PROVIDES UNEQUALED SHELL PRODUCTION

Sutter Automatic Shell Molding Machines are standard units which now bring the amazing economies of shell molding within the reach of virtually every production foundry. Featuring a completely automatic cycle, due to push button operation, Sutter Automatic Shell Molding Machines can produce a minimum of 45 shells per hour or a maximum of 60 shells per hour. Machine cycle time is only 33 seconds plus curing and coating time.

The only manual operation of the machines is starting, removing completed shells and occasionally loading the resin bin. This means that even unskilled labor can maintain quality production. Sutter Automatic Shell Molding Machines are designed to accommodate 95% of the applications for shell molding without special engineering, experimentation or expensive cut-and-try.

SLASHES LABOR COSTS

The automatic cycle of Sutter Shell Molding Machines cuts labor costs two ways. First, two machines may be operated easily by one operator. This means that from 90 to 180 complete shells per hour can be produced by one operator. Second, this operator need not be skilled!! Both production and quality are independent of human skill because the production of shells is completely automatic.

MAINTAINS HIGHEST QUALITY

With variable coating and curing adjustments it is possible for Sutter Automatic Shell Molding Machines to achieve exact quality and production efficiency regardless of production requirements or nature of the shell being produced. These versatile machines can be used with equal effectiveness on all your shell molding applications. Complete changeovers can be made from production of one mold to another in a matter of minutes.

Sutter Automatic Shell Molding Machines are built to provide years of continuous service with freedom from repair. Every detail has been carefully considered by men who are intimate with the demands of foundry production and equipment.

SUTTER

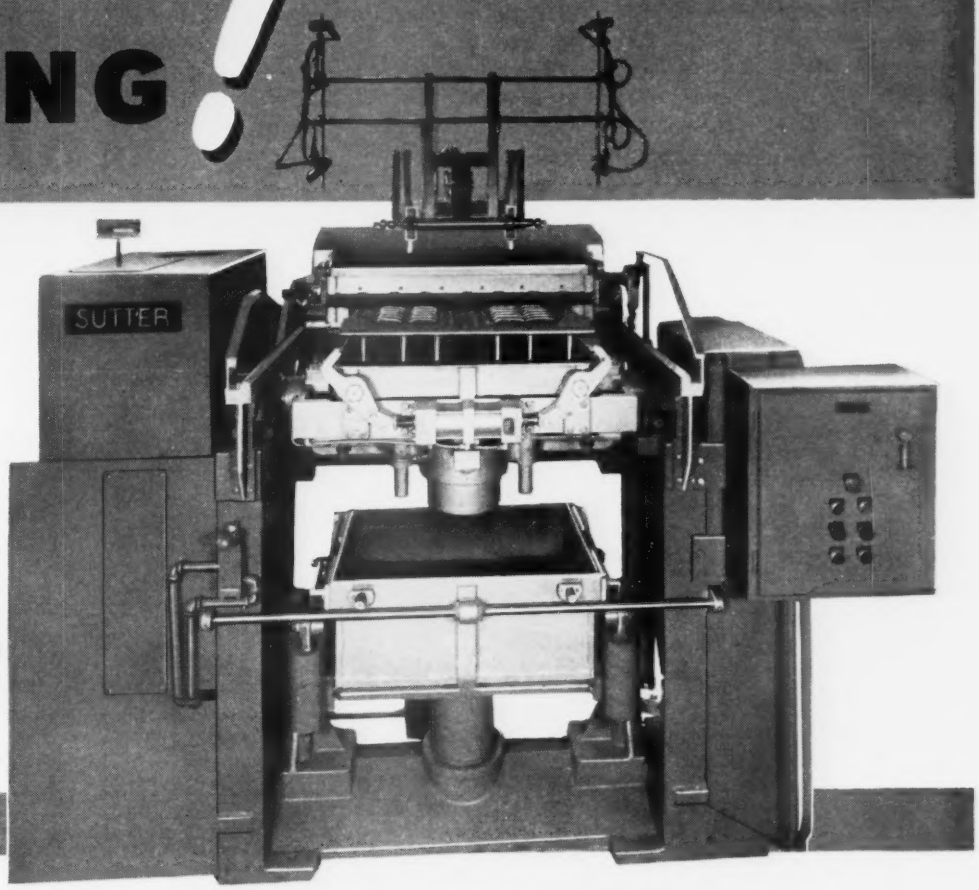
SUTTER PRODUCTS CO.

2005 WESTWOOD AVE. • DEARBORN, MICH.

SHELL MOLDING!

Latest Advance

IN FOUNDRY EQUIPMENT



The Sutter Automatic Shell Molding Machine

NOTE THESE EXCLUSIVE ADVANTAGES . . .

- Curing Oven—Automatic controls. Gas or electric optional.
- High, clean stripping for quick, trouble-free ejection of the shell.
- All electric controls to J.I.C. standards.
- Rugged cast machine members—super-sturdy con truction throughout.
- Ample resin bin capacity—easily accessible.
- Anti-friction bearings and bushings at all critical wear points.
- Machine cycle controlled by trouble-free cam turret design.
- Adjustable coating and curing cams.
- Automatic spray for mold release. Includes pressure tank.

These are but a few of the reasons why these machines are being acclaimed by foundrymen the world over as one of the great advancements in foundry equipment.

For complete details, write for bulletin S.

SOLVE YOUR FOUNDRY PRODUCTION PROBLEMS WITH SUTTER SPECIAL FOUNDRY EQUIPMENT

Core Grinding problems solved by machines designed for the special demands, including fixtures, etc.

Automatic Water tests of various types of rough castings.

Rollover Power draw machines are interchangeable for right or left hand jacket cores, replaced single hand and hand draw operations. Result, production more flexible, reduced labor fatigue.

Automatic Power rollover and draw machines designed by Sutter, saved labor and increased core production.

Core Assembly and setting fixtures engineered by Sutter to meet specified customer's requirements.

(*Concluded from page* 158)

that particular occasion my suffering was so acute I could have split him cheerfully with a tomahawk and then burned him at the stake. In fact, a mental contemplation of the noble blue alcohol blaze he would make was the only flicker of pleasure I had."

"All I can remember of that old poem," I said, "is the last line 'Our sailor oft could scarcely shift to find a dinner plain and hearty, but never changed the coin and gift of Bonoparte.' Pronounced of course 'Bony-party.'"

"That's it," Bill admitted. "Pretty awful drivel if you ask me. You can imagine what it sounded like coming from a half-pickled goat. With your kind permission we shall creep out of the ice box and consider an inquiry I had recently from a man who wrote that in a 48-in. cupola he melted a mixture of 60 per cent scrap and 40 per cent pig iron, with a blast pressure of 9 oz. The cupola melting loss was 4 to 4.5 per cent. He wanted to know how that checks up with the melting loss in other foundries.

Before touching upon a few of the many variables entering into the calculation of melting losses in the cupola, it may be sufficient to state that a loss of 4 to 4.5 per cent—presumably calculated carefully—represents ordinary or normal cupola practice. The reason we insert that clause—presumably calculated carefully—is because the cupola melting loss is an item that is calculated by *difference*. As a result it usually represents a guess rather than something secured by actual calculation.

For example, each charge that goes into the cupola, presumably 2000 lb, is only an approximate 2000 lb. Under close supervision or in the hands of a careful man the amount may vary between 1975 and 2025 lb. In periods of stress or hurry the conscience of a charging man will tolerate variations between 1900 and 2100 lb. Therefore while the charge sheet for a 10-ton heat shows that ten 2000-lb charges were placed in the cupola, the actual amount may have been 1000 lb over or under that amount. Naturally an illusive factor of that kind will affect the accuracy of a final calculation designed to show the melting loss.

A fairly close check can be kept on the amount of iron tapped from the cupola. The cleaned castings can be weighed. The gates and sprues, the over iron and the miscellaneous spills also may be weighed. Usually the difference in weight between the sum of these items and the amount of iron charged into the cupola is accepted as the melting loss. For all practical purposes this is sufficient, but it is not technically correct, since part of the difference is due to iron remaining in the sand in the form of shot and small scrap, iron removed in the cupola drop, iron removed by the grinding wheels and tools in the cleaning room. Properly speaking the term "melting loss" applies only to iron lost in the melting process—that is, iron lost through oxidation or in the slag.

Several years ago the American Foundrymen's Society attempted to settle the question: What is the melting loss in the cupola? Reports from five general jobbing shops showed losses ranging from 4.3 to 13.6 per cent. In four light jobbing shops the loss was from 4 to 6 per cent. Three light machinery shops showed a variation of 2 to 11.3 per cent. Four heavy machinery shops ranged between 4 and 8.4 per cent. Other classifications included stove-plate 2 to 4.5 per cent, sanitary ware 3 to 7.9 per cent, agricultural 3.6 to 5.3 per cent, railroad castings 3.9 to 6.1 per cent, floor plates, grate bars, etc., 6.2 to 7.3 per cent, car wheels 2.1 per cent. In the January 1936 FOUNDRY, J. A. Lanigan described an elaborate series of tests over a six-month period which showed losses in many instances under 1 per cent.

OHIO REGIONAL CONFERENCE

To Be Held Sept. 26-27

TENTATIVE program for the fifth Ohio Regional Foundry Conference to be held at Columbus, O., Friday and Saturday, Sept. 26-27, has been announced. The conference, sponsored by the five Ohio chapters and the Ohio State student chapter of the American Foundrymen's Society, will be under the general chairmanship of Dr. Douglas C. Williams, Ohio State University.

Most of the two days' sessions will be held on the Ohio State campus; the annual banquet Friday evening will be at the Deshler Wallick Hotel. The conference will open Friday morning at 10:30, and all of the sessions that day will be of a general nature. Sectional meetings are scheduled for Saturday, with separate sessions devoted to gray iron, steel, malleable iron, and nonferrous metals.

Other members of the general conference committee are associate chairmen Charles T. Greenidge, Battelle Memorial Institute, Eldon Boner, Cooper-Bessemer Corp., and Clyde E. McQuiston, Ohio State.

The detailed program follows:

Friday, Sept. 26

9 a.m.—Registration, Ohio State Museum.

10:30 a.m.—Opening session, Ohio State Museum.
Address of welcome, William T. Bland, Commercial Steel Castings Co., Marion, O., chairman, Central Ohio Chapter; welcome to campus, Kenyon S. Campbell, field director, Ohio State University Development Fund; "The Boss and You—How Do You Get Together?" by Maj. Charles T. Estes, special assistant, Federal Mediation and Conciliation Service.
Chairman: Dr. D. C. Williams, Dept. Industrial Engineering, Ohio State University.

12:30 p.m.—Luncheon, New Ohio Union.
"Alaska," by Dr. Richard Anderson, Battelle Memorial Institute, Columbus, O.
Chairman: Eldon Boner, Cooper-Bessemer Corp., Mt. Vernon, O.

2 p.m.—General Session, Ohio State Museum.
"Metal Removal," by Jerry Grote, Unitcast Corp., Toledo, O.
Chairman: David C. Ekey, Dept. of Industrial Engineering, Pennsylvania State College.

3:30 p.m.—General Session, Ohio State Museum.
"Gases in Metal," by Dr. C. E. Sims, Battelle Memorial Institute, Columbus, O.
Chairman: Dr. J. W. Spretnak, Dept. of Metallurgy, Ohio State University.

7 p.m.—Banquet, Deshler Wallick Hotel.
"Problems in Our Atomic Age," by Dr. Alfred B. Garrett, Dept. of Chemistry, Ohio State University.
Chairman, Charles T. Greenidge, Battelle Memorial Institute, Columbus.

Saturday, Sept. 27

9 a.m.—Registration, Foundry Lecture Room, Industrial Engineering Bldg.

9:30 a.m.—Sectional Meetings:
Gray Iron Division, Room 100, Derby Hall.
"My Experience as a Superintendent of a Gray Iron Foundry," by John Sharritts, manufacturer's representative, Cleveland.
Chairman: Henry Trenkamp, Ohio Foundry Co., Cleveland.
Steel Division, Room 100, Physics Building.
"A Modern Method of Determining and Utilizing Grinding Wheel Efficiency in Incentive Pay Systems," by Patrick Collins, Michigan Steel Castings Co., Detroit.
Chairman: Victor E. Zang, Unitcast Corp., Toledo, O.
Nonferrous Division, Room 110, Physics Building.
"Aluminum Alloy Test Bars—Their Meaning and Production," by Don LaVelle, Federated Metals Division, American Smelting & Refining Co., New York.
Chairman: W. J. Klayer, Aluminum Industries Inc., Cincinnati.
Malleable Division, Room 213, Industrial Engineering Building.
"Effect of Oxidizing Rates During Cupola Melting on the Graphitization of Malleable Iron," by Milton J. Tilley, National Malleable & Steel Castings Co., Cleveland.
Chairman: Charles Bunting, Rockwell Mfg. Co., Barberton, O.

10:30 a.m.—Sectional Meetings:
Gray Iron Division, Room 100, Derby Hall.
"Cupola Operation," by Ford Snyder, Hickman-Williams Co., Chicago.
Chairman: Henry Trenkamp, Ohio Foundry Co., Cleveland.
Steel Division, Room 100, Physics Building.
"Metallurgy and Mechanics of Hot Tearing," by W. S. Pellini, Naval Research Laboratory, Washington.
Chairman: Victor E. Zang, Unitcast Corp., Toledo, O.
Nonferrous Division, Room 110, Physics Building.
"High Strength Aluminum Alloys Without Heat Treatment," by Donald L. Colwell, Apex Smelting Co., Chicago.
Chairman: Walter J. Klayer, Aluminum Industries Inc., Cincinnati.
Malleable Division, Room 213-B, Industrial Engineering Building.
"Malleable Iron Practice," by James S. Lansing, Malleable Founders' Society, Cleveland.
Chairman: Fred Pfarr, Lake City Malleable Iron Co., Cleveland.

12 noon—Luncheon, New Ohio Union.
"Industrial Mobilization," by speaker from Wright-Patterson Air Force Base, Dayton, O.

2 p.m.—Ohio State University—Indiana football game, Stadium.

Your Assurance That Thor AIR HAMMERS are *still* your best buy!

Plate Valve Chipping Hammers in four sizes . . . 14 additional air hammer models with plate, spool and sleeve valves for chipping, scaling, core busting and other foundry applications.

Since pneumatic tools were first invented, Thor AIR TOOLS have been the leaders for foundry service—first in air economy, first in rugged durability, first and foremost in the terrific POWER that has made the name THOR famous in air tools! For demonstration, contact your Thor factory branch or write Independent Pneumatic Tool Co., Aurora, Illinois.

Thor PORTABLE POWER TOOLS

PNEUMATIC • 180 and 360 CYCLE HIGH FREQUENCY ELECTRIC • UNIVERSAL ELECTRIC

Industry BRIEFS

ARLINGTON Industries Inc., 100 North Collins St., Arlington, Tex., recently formed, has built a foundry for production of sand and permanent mold aluminum and magnesium castings for aircraft. Arthur Olsen is president; William Boustead, vice president and general manager, and Holly Wilmoth, secretary-treasurer.

* * *

J. O. Ross Engineering Corp. has opened an office at 823 Skinner Bldg., Seattle 1. K. H. Jonees will be in charge of the branch and will supervise design and installation of company air systems, industrial ovens, driers and heaters.

* * *

A new pattern shop and locker room building to replace a fire-razed facility of the Shenango-Penn Mold Co., Neville Island, Pa., has been completed by the Rust Engineering Co., the designer-constructor.

* * *

M & K Metal Casting Co. was incorporated at Albany, N. Y., Apr. 18 to manufacture and sell white metal castings and operate a metal plating plant. Directors are: James T. Kearns, 88-22 212th St., Queens Village; James W. Kearns, 43-17 159th St., Flushing, and Carl Mauro, 33-07 Junction Blvd., Corona, all of New York.

* * *

Ajax Electric Co., Philadelphia, has appointed the following sales representatives: Samson Sales Co., San Francisco, for Nevada and northern California; Richards-Conant, Denver, for Wyoming, Colorado, Utah, Arizona, and New Mexico, and W. E. Hartley, Seattle, for Washington, Oregon, Montana and Idaho.

* * *

Industrial Castings & Forgings Co., Law & Finance Bldg., Pittsburgh, has been formed as a partnership by R. M. Maxwell and P. S. Oliver. Firm represents steel and nonferrous casting and forging companies in the area.

* * *

Valve Division, Minneapolis-Honeywell Regulator Co., has established a research center in Philadelphia to support a development program in industrial valves.

* * *

Sterling Casting Co., 1000 West Wiley Ave., Bluffton, Ind., has been sold to Arthur E. A. Mueller, Wausau, Wis., who also owns Midwestern Foundry Inc., Garrett, Ind., and Three Rivers Foundry, Three Rivers, Mich. Change in ownership will not affect top management of Sterling.

* * *

Apex Smelting Co., Chicago, has acquired 20 acres in the Los Angeles industrial area where it will construct a plant which is expected to be producing aluminum alloys by late fall. When completed, the plant also will produce magnesium and zinc-base die cast alloys.

* * *

Paragon Tool & Die Co., Bronx, N. Y., has been incorporated to operate as a foundry, metal working and machine shop. Directors are Max B. Green, 1561 Unionport Rd., Bronx; Milton Spitzer, 3551 De Kalb Ave., Bronx, and Walter Spitzer, 20 William St., Mount Vernon, N. Y.

* * *

Robert G. Evans Co., 6315 Brookside Plaza, Kansas City, Mo., has been formed to distribute masonry and concrete sawing equipment. The president, Mr. Evans, was one of the original founders of Clipper Mfg. Co., Kansas City.

* * *

Kuhlman Electric Co., Bay City, Mich., has purchased assets of Queensboro Transformer & Machinery Co., Crystal Springs, Miss., and leased a transformer manufacturing plant which has been under construction at Crystal Springs.

* * *

Wark Foundry Equipment Co., 97 Woodcrest Blvd., Kenmore 23, N.Y., formerly was known as Wark Foundry Services. Companies represented by Wark include Newago Engineering Co., SPO Inc., Delta Oil Products Co. and Shanafelt Mfg. Co.

* * *

Palmer Foundry Co., 412 East Bay View Ave., Biloxi, Miss., started about a year ago by J. A. Palmer for producing brass and aluminum castings, has expanded into production of gray iron castings.

* * *

Diamond Alkali Co., Cleveland, has acquired processes owned by Spence Metals Research Co., Pittsburgh. Harry R. Spence, Spence owner and president, has been retained as a consultant in the field.

* * *

Bedford Tool & Forge Co., 22 Interstate St., Bedford, O., manufacturer of hand and pneumatic chisels, has appointed Gurley-Ortman Inc., 3210 North Major Ave., Chicago 34, as Chicago distributor.

* * *

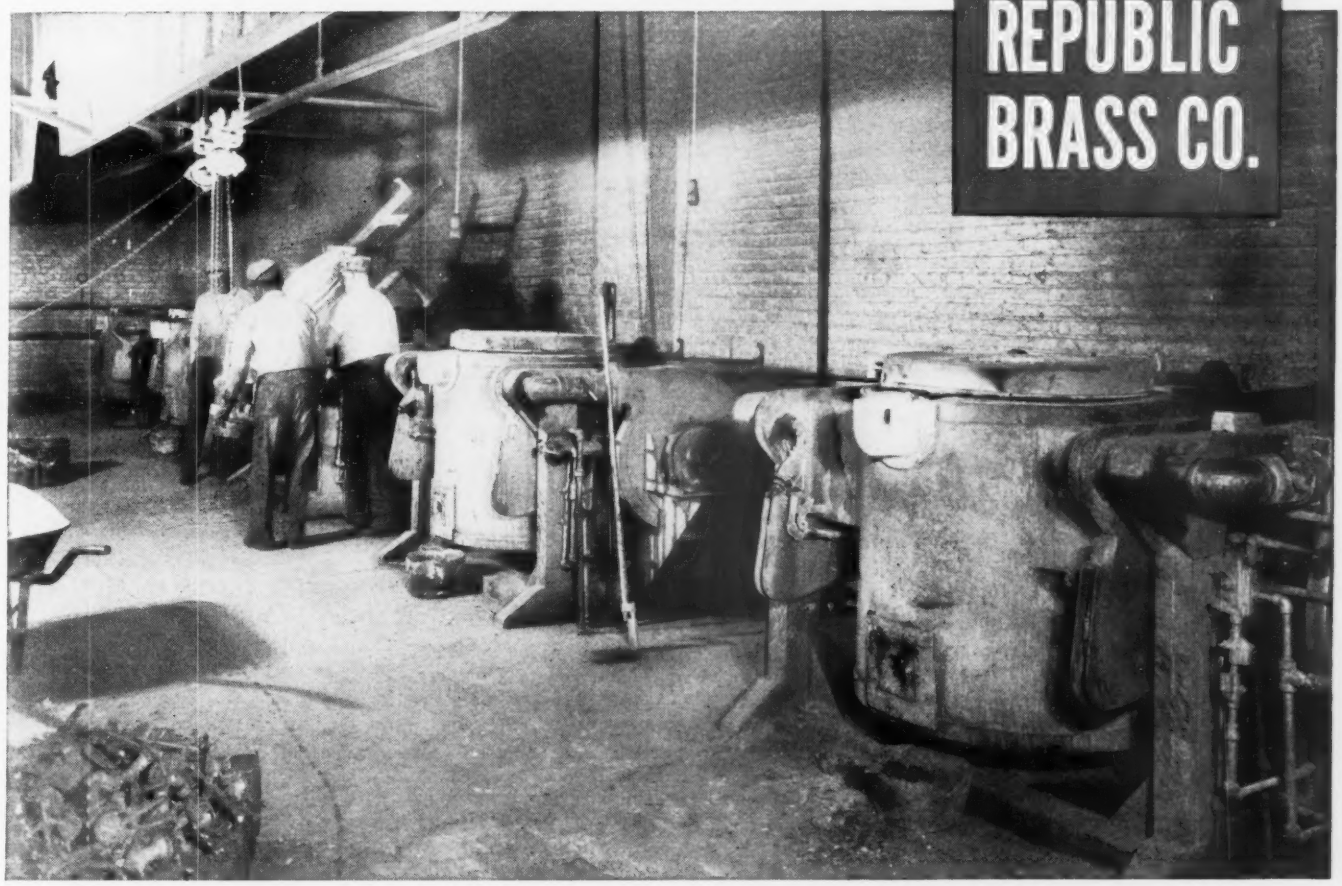
Harnischfeger Corp., Milwaukee, has opened its new Diesel Engine Division in Crystal Lake, Ill. The new

(*Concluded on page* 166)

NEW PLANT: Universal Engineering Co., Frankenmuth, Mich., is operating a new plant at Bad Axe, Mich., for the manufacture of flask pins and bushings. The building provides approximately 14,000 sq ft of manufacturing space on two levels and contains complete manufacturing and inspection facilities, including a heat treating department

6 LINDBERG-Fishers for 6 years

and all's well at REPUBLIC BRASS CO.



LINDBERG-Fisher BRASS MELTING FURNACES STAND THE GAFF

All's well at The Republic Brass Co., (Division of Briggs Mfg. Co.), Cleveland, Ohio—manufacturer of water faucets and related plumbing fixtures. In 1945, as part of a modernization program, Republic installed six Lindberg-Fisher brass melting furnaces. These oil fired, constant arc, nose-pouring furnaces have more than withstood the test of time . . . and maintenance has been almost nil.

Here's what Mr. J. J. Smith, Republic's foundry superintendent thinks of his six Lindberg-Fisher brass melting furnaces:

"We have had six Lindberg-Fisher brass melting, nose-pouring, 1200 pound capacity furnaces for six years, and have had very good results from them . . . They deliver more than 100 heats per crucible . . . one hour twenty minutes per heat . . . 18 months lining life. They have performed very satisfactorily as to upkeep, and we have had excellent operating results."

Check these advantages of Lindberg-Fisher Hydraulic Nose-Pouring Melting Furnaces

- Constant pouring arc regardless of degree of furnace tilt.
- Rate of pouring always under positive and constant finger-tip control.
- Special trunnion mounting permits lower construction than hand tilting furnace.
- Reduced height facilitates charging cold metal, and observation of metal.
- Metal waste and pouring hazard greatly reduced by closeness of ladle to pouring spout.
- Labor saving . . . simple control enables one man to pour and transfer metal.

Write for Bulletin No. 57-A for more information on MNP-Motorized Tilting and HNP-Hydraulic Tilting Constant Arc Nose-Pouring Furnaces.

LINDBERG-Fisher MELTING FURNACES

Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois

(*Concluded from page* 164)

building, covering over 100,000 sq ft on an 80-acre tract of land, houses both the plant and general offices of the division.

* * *

Leeds & Northrup Co., Philadelphia, has purchased a 125-acre tract of land at North Wales, Pa., in the Philadelphia suburban area and contemplates moving certain operational or laboratory units from its main plant to the new location.

* * *

Midwest Foundry Sand & Materials Co., Milwaukee, has been formed to sell and service foundry and other refractory materials. Samuel Weitzen, 710 North Plankinton Ave., Milwaukee 3, is the company's registered agent.

* * *

Gray Iron Research Institute Inc., formerly at 1300 Grandview Ave., has moved to 870 West Third Ave., Columbus 8, O.

* * *

American Refractories & Crucible Corp., North Haven, Conn., has opened a new warehouse and office at 440 Seaton St., Los Angeles.

* * *

Johns-Manville Corp., New York, will expand its Watson, Calif., plant for the production of industrial insulations. Construction of the building to house the new operations is expected to be completed in the fall of 1953.

* * *

Askania Regulator Co., Chicago, has appointed Heat & Control Inc., 270 Seventh St., San Francisco 3, representative to handle the company's line of hydraulic automatic control equipment.

* * *

Commercial Iron Works, 2021 S.E. Grand Ave., Portland 4, Oreg., suffered fire damage Apr. 22 estimated between $50,000 and $80,000.

* * *

Rotor Tool Co., formerly of 17325 Euclid Ave., has moved into a new air-conditioned plant at 26300 Lakeland Blvd., Cleveland 23.

* * *

Morrison Industries Inc., Cleveland 28, designer and builder of industrial process equipment, has moved from 17700 Broadway to 17100 Miles Ave.

* * *

Brown Foundry Corp., 1045 Cambridge Ave., Camden 5, N. J., suffered fire damage estimated at $4000 May 7.

* * *

The 15 plants of both the Milwaukee and West Milwaukee works of Chain Belt Co. were open to the public during an Open House recently. Close to 10,000 persons toured the plants and saw displays concerning the company and its activities.

* * *

American Brass & Iron Foundry, 7825 San Leandro Blvd., Oakland 21, Calif., was destroyed by fire May 15.

* * *

Federal Burner Corp. has moved into its new foundry at 2341 West Jefferson, Torrance, Calif.

Issues Report on Smog In Los Angeles Area

Recent annual Technical and Administrative Report on Air Pollution Control in Los Angeles County, Calif., contributes to the understanding of physical and chemical properties of smog. It discusses meteorological conditions leading to development of smog concentrations, how smog affects people and vegetation, air contaminants present in smog, and how smog is controlled.

Other sections deal with administration of the Air Pollution Control District of Los Angeles County, analysis of Los Angeles atmosphere, chemical and physical properties of Los Angeles smog, total daily emissions to the Los Angeles atmosphere, and reduction in pollution levels brought about by the control program.

Meetings of Interest to Foundrymen

Sept. 8-10—American Standards Association, national standardization conference, Museum of Science & Industry, Chicago

Sept. 8-12 — Instrument Society of America, national conference and exhibit, Cleveland

Sept. 18-19 — National Foundry Association, annual meeting, Edgewater Beach Hotel, Chicago

Sept. 22-23—Steel Founders' Society, fall meeting, the Homestead, Hot Springs, Va.

Sept. 26-27—Ohio Regional Foundry Conference, Ohio Chapters, AFS, and Ohio State Student Chapter, Ohio State University, Columbus, O.

Oct. 16-17—Gray Iron Founders' Society, annual meeting, Hotel Cleveland, Cleveland

Oct. 16-18—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 17-18 — Michigan Regional Conference, Central Michigan, Detroit, Saginaw Valley, and Western Michigan Chapters, AFS, University of Michigan, Ann Arbor, Mich.

Oct. 20-24 — American Society for Metals, National Metal Congress and Exposition, Philadelphia

Oct. 24-25—Northwest Regional Foundry Conference, Oregon, Washington, and British Columbia Chapters, AFS, Multnomah Hotel, Portland, Oreg.

Oct. 30-31—Metals Casting Conference, sponsored by Purdue University, Michiana and Central Indiana AFS chapters, Purdue University, West Lafayette, Ind.

Oct. 31—Nov. 1—All Canadian Foundry Conference, sponsored by Eastern Canada and Ontario Chapters, AFS, Mount Royal Hotel, Montreal

Nov. 13-14—Southwestern Regional Foundry Conference, Texas and Tri State Chapters, AFS, Baker Hotel, Dallas, Tex.

Nov. 19 — American Standards Association, annual meeting, Waldorf-Astoria Hotel, New York

Nov. 20-21 — American Society for Quality Control, Midwest conference, Claypool Hotel, Indianapolis

Dec. 4-6—American Institute of Mining & Metallurgical Engineers, electric furnace steel conference William Penn Hotel, Pittsburgh

1953

Jan. 19-22—Plant Maintenance Show and Conference, Public Auditorium, Cleveland

Feb. 12-13—Wisconsin Regional Foundry Conference, sponsored by Wisconsin Chapter, AFS, and University of Wisconsin, Schroeder Hotel, Milwaukee

Feb. 19-20—Southeastern Regional Foundry Conference, sponsored by Birmingham, Tennessee, and University of Alabama Student Chapters, AFS, Tutweiler Hotel, Birmingham

Mar. 2-6 — American Society for Testing Materials, spring meeting, Statler Hotel, Detroit

Mar. 12-13—Foundry Educational Foundation, annual TAC-UAC conference, Cleveland

May 4-8—American Foundrymen's Society, annual convention, Chicago

June 29—July 3—American Society for Testing Materials, annual meeting, Chalfonte-Haddon-Hall, Atlantic City

SAVE 25% ON BAKING TIME

WERNER G. SMITH SUPER-FAST BAKING NO. 500 CORE OIL

- Cuts oven time by at least 25%; in many cases more.
- Boosts core production 25% with no costly capital outlays.
- Bakes thick chunks through rapidly, without developing cracks.
- Develops exceptional strength. You need 20% to 30% less oil.
- Extra strength provides an extra margin of safety at leaner ratios.
- Thick and thin core sections bake out safely side by side.
- High fluidity for easy mulling and excellent workability.
- Low cost: approximately $1. per gal. And . . . you need 20% to 30% less.
- Simple to use (Just pull the cores 25% sooner). Fool-proof performance.
- Made by Werner G. Smith . . . your assurance of uniform quality.

A trial drum will be sent on approval. Ask us about it.

WERNER G. SMITH, INC. 1730 TRAIN AVENUE, CLEVELAND 13, O., PHONE: TOwer 1-3676

Activities of Foundry

GROUPS

Quad City

SIXTEEN of the original members of the Quad-City Foundrymen's Association, organized in 1922, were honored at the May 19 meeting of the Quad City Chapter of AFS held at the Fort Armstrong Hotel, Rock Island, Ill. Past officers of the chapter, which succeeded the original association in 1935, also were honored.

Lawrence Pridmore, president, International Molding Machine Co., LaGrange Park, Ill., spoke on "Core Blowing." Mr. Pridmore explained the importance of proper venting of core-boxes and the proper size and location of blowholes. He also emphasized that too many rods, wires and miscellaneous "hardware" often are used in making cores. The importance of proper maintenance and housekeeping around the coreblowers was emphasized. Mr. Pridmore illustrated his talk with slides.

In conjunction with the talk, the speaker displayed numerous accessories for use in coreboxes, and actually blew cores on two small blowers. Boyd Hays, John Deere Malleable Iron Works, presided at the meeting and Roy Ray, of J. I. Case Co., served as technical chairman.

Officers elected to serve the coming year are: Chairman, Boyd Hays, John Deere Malleable Iron Works; vice chairman, Eric Welander, John Deere Malleable Iron Works; secretary-treasurer, Robert Miller, John Deere Planter Works. Elected to serve as directors are: William Ellison, Thiem Products Inc.; Clifford Erickson, Frank Foundries; Leo Jackson, J. I. Case Co.; Lee Ingersoll, Iowa Malleable. William C. Bell, Frank Foundries, the efficient chairman of the past year, will also serve as a director during the coming year. *—Eric Welander, John Deere Malleable Works*

Chesapeake

FOUNDRY Developments at Home and Abroad" were discussed by H. N. Bogart, metallurgist, Ford Motor Co., Dearborn, Mich., at the May 23 meeting of the Chesapeake Chapter of AFS. During election of officers for the following year, C. D. Galloway, Chambersburg Engineering Co., Chambersburg, Pa., was named chairman, and William H. Baer, Naval Research Laboratory, Washington, was elected vice chairman.

Mr. Bogart described the following new techniques, some being still in the experimental stage. Water cooled elements in the cupola and around tuyeres are not covered with refractory. Cupolas so lined are running for weeks without relining. Oxygen is being bled into cupola blasts when the iron is too cold at the beginning of a heat. Humidity control of the cupola air eliminates one variable. Multiplexing the cupola with an electric furnace is proving more economical.

In conclusion, Mr. Bogart stated

(*Continued on page* 172)

ST. LOUIS Chapter of the AFS invited indentured apprentices under the joint apprenticeship program in the St. Louis area to a recent regular meeting. Certificates of completion and copies of *Machinery's Handbook* were presented to four patternmaking apprentices who had completed their training. They are, left to right: John Burkholder Jr., Marvin Henke, Warren Key and Curtis Tucker. Left to right in background are: Paul Retzlaff, Busch-Sulzer Bros.; Walter A. Zeis, Foundry Supplies & Equipment; Ed Belton, Progressive Pattern Co.; Ralph Hill, East Side Casting Co. and chapter chairman; C. E. Rutledge, Department of Labor, Bureau of Apprenticeship; F. W. Burgdorfer, Missouri Pattern Works, chairman of St. Louis Pattern Manufacturers Association and chairman of patternmakers joint apprenticeship committee, who made the presentations; Hal Gilker, David Ranken School of Mechanical Trades, and J. A. Flavin, president, St. Louis Association, Patternmakers League of North America

IF YOU WANT BETTER CORES...

don't by-pass these 4 good points that lead to proved results!

GET ON-THE-JOB SERVICE

Foundrymen are finding it pays to unload core making problems on the Houghton Man. And if "shirtsleeve" cooperation is what it takes, he's ready to work closely with you to arrive at sound, practical solutions.

PROFIT BY HOUGHTON KNOW-HOW

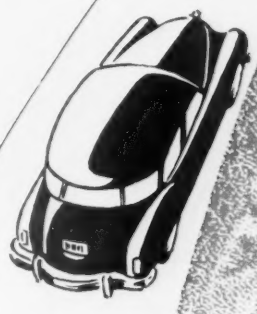
For example, our long foundry experience and knowledge of core oils offer you many benefits. Among them are a host of tests on the effect of various types of sands and their performances with different core oils. We've found that the sand and the oil must be "matched" to produce trouble-free cores.

CUT COSTS BY STANDARDIZING

There is a specific core oil in the HY-TEN Series which will meet your needs. These are formulated to provide fast baking, high tensile strength, high green strength, longer baking at elevated temperatures, less gassing, as required. Foundry procedure is simplified by selecting the proper Hy-Ten for your needs.

MAKE USE OF CONTINUING RESEARCH

Many Hy-Ten users are taking advantage of Houghton's continuing research program—sharing in our latest developments and applications of new raw materials. Why not use Hy-Ten Core Oils in *your* foundry? They'll cut your costs and reduce your core making problems.



Write to E. F. Houghton & Co., Philadelphia 33, Pa., if you want latest Hy-Ten Bulletin.

Hy-Ten Core Oils

. . . products of

E. F. HOUGHTON & CO.

PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

Herman MOLDING MACHINES

help make this foundry a good place to work

ALUMINUM FOUNDRY
•
MAGNESIUM FOUNDRY
•
SEMI-STEEL FOUNDRY

Howard Foundry Co.
Chicago, Illinois

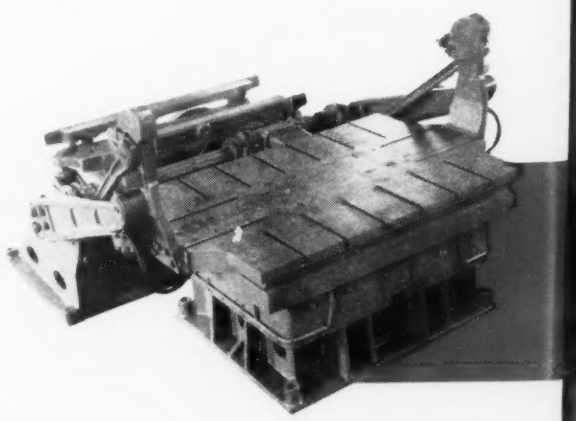
because—"Here in all three plants of Howard Foundry, producing a wide range of aluminum, magnesium and semi-steel castings, Herman Molding Machines have proven themselves over the years to be fast, accurate and ideally suited for our type of work.

"The best indication of our reliance on the performance of Herman Molding machines lies in the fact that we have recently ordered nine additional machines, ranging in roll-over capacity from 3,000 to 10,000 pounds. Our Plant Superintendents, and Chief Engineers feel that the adaptability of the Herman machines, their simplicity of operation and low maintenance cost have been sufficiently demonstrated over a long period of time to justify their acceptance by all production personnel throughout the organization."

HOWARD FOUNDRY COMPANY

You too can put Herman Molding Machines to work with the assurance of a similar experience to Howard Foundry. All Herman Molding Machines are carefully engineered, simple to operate with one valve assuring fast, steady hydraulic action for rollover and pattern draw. No power is required for the rollback operation. Pressure lubrication is applied to each moving part.

For more details, call our representative in your area, or write the address below.

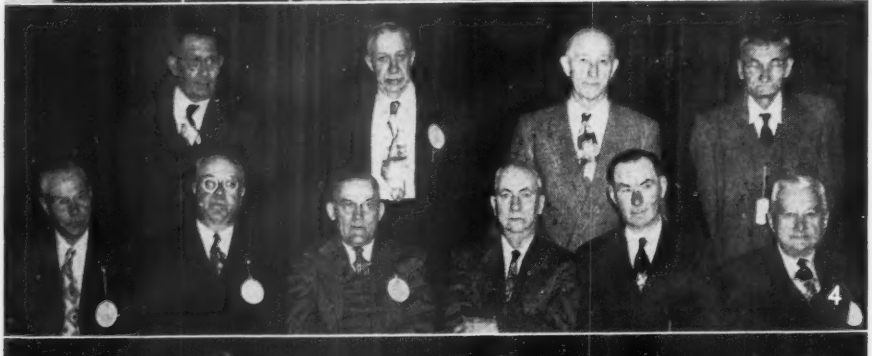


Herman **MOLDING MACHINES**

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

The ad reproduced herewith originally appeared in the August, 1949, issue of FOUNDRY.

This Foundry is A GOOD PLACE TO WORK
HOWARD FOUNDRY CO., Semi-Steel Division
Herman
MEMBER
MOLDING MACHINES
HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.
HERMAN MOLDING MACHINES
HAVE MADE THEIR WAY BY THE WAY THEY'RE MADE



WISCONSIN Chapter of the AFS celebrated old timers and apprentices night May 16 at Hotel Schroeder, Milwaukee. Shown in Fig. 1 is a group of apprentices. Left to right, are: R. Schuttenbelm, H. Krolikowski, E. Walker, M. Davis, H. Zajciek, A. LaJuene, J. Kohler and M. Schuller, all of Allis-Chalmers Mfg. Co. Fig. 2 shows a group of old timers. Left to right: J. A. Leisk, J. J. McDevitt, George Coughey, Stan Huber, Tony Helgerson, John Spranger, Harry Leach and Herman Bartz. Left to right in Fig. 3 are: Henry Grube, Waukesha Foundry Co., Waukesha, Wis., apprentice contest winner in steel molding; A. A. Bottoni, foundry instructor, Milwaukee Vocational School, and David Schroeder, wood patternmaking apprentice contest winner. In Fig. 4 is a group of new old timers. Left to right in Fig. 5 are: Elroy Hirsch, who showed a film on highlights of 1951 football games; Carl Taylor, president, Waukesha State Bank, who spoke on "America Tomorrow," and Chapter President G. E. Tisdale, Zenith Foundry Co. Photos by W. V. Napp, Delta Oil Products Co.

(*Continued from page* 168)

that he believes the foundry industry has just scratched the surface in its technological development.—*Joseph O. Danko Jr., Arlington Bronze & Aluminum Corp.*

Central Indiana

PAST chairmen of the Central Indiana Chapter of AFS were honored at its meeting on May 19. Past chairmen present for the affair were: I. R. Wagner, Electric Steel Castings Co.; Franklin Swain, Golden Foundry Co.; Allen Reid, General Refractories; Robert Langsenkamp, Langsenkamp-Wheeler Brass Works. Also honored was William B. Ziegelmueller, late president of Electric Steel Castings Co., who died recently.

Principal speaker was George Anselman, Beloit Foundry Co., Beloit, Wis., who spoke on "Molding and Core Sands." Mr. Anselman emphasized the point that there is no compromise on proper sand mixing. Sand must be right or it should go back to the reclaimer. All facings in the foundry should be tested before being sent into the shop. Only in this way will it be possible to use an all-purpose three-screen sand. Allen Evans, International Harvester Co., was technical chairman. — *Paul V. Faulk, Electric Steel Castings Co.*

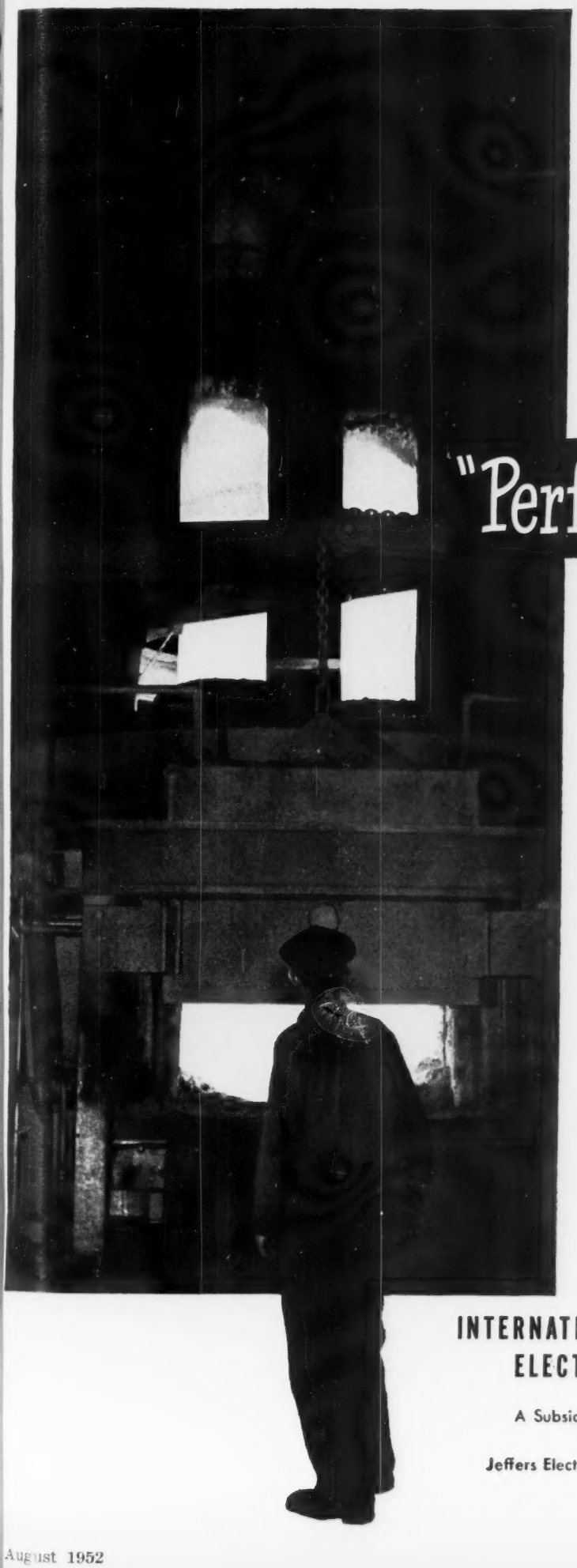
Twin City

NEARLY 90 members and guests met at the Covered Wagon, Minneapolis, to hear Donald J. Murray, foundry products department, the Borden Co., New York, discuss "Resin Bonded Core Sands" at the May 13 meeting of the Twin City Chapter of AFS.

The following newly elected officers were introduced: Chairman, J. W. Costello American Hoist & Derrick Co., St. Paul; vice chairman, O. J. Myers, Foundry Products Division, Archer-Daniels-Midland Co., Minneapolis. Directors elected to serve three years are: C. Fred Quest, J. F. Quest Foundry Co., Minneapolis; William Williamson, Minneapolis-Moline Power Implement Co., Hopkins, Minn.; Carter de Laittre, Minneapolis Electric Steel Castings Co., Minneapolis; Richard Wilson, American Hoist & Derrick Co., St. Paul. Norman Wisner, Foundry Supply Co., Minneapolis, was elected to serve as director for one year.

Mr. Murray indicated that urea resin is the workhorse of the resin core binders. Phenols, he said, are used only against heavy metal sections and for high melting temperature metals. Stress was placed on

(*Continued on page* 174)



For higher tonnages...

I.G.E. "Performance-Proved" Electrodes

Experienced furnace operators will tell you,

I.G.E. Electrodes give you higher tonnages because their design is performance-proved.

I.G.E. engineers carefully analyze electrodes during actual operation, then decide the characteristics they should possess . . .

Uniform structure of controlled densities
High mechanical strength
Low electrical resistance

These properties are the result of I.G.E.'s close quality control and painstaking methods of manufacture.

Coupled with I.G.E. quality is I.G.E. technical service. The I.G.E. service man—with a broad background in all phases of furnace operation—is ready to help with *your* electrode problems.

IGE

INTERNATIONAL GRAPHITE AND ELECTRODE CORPORATION

St. Marys, Pennsylvania

A Subsidiary of Speer Carbon Company

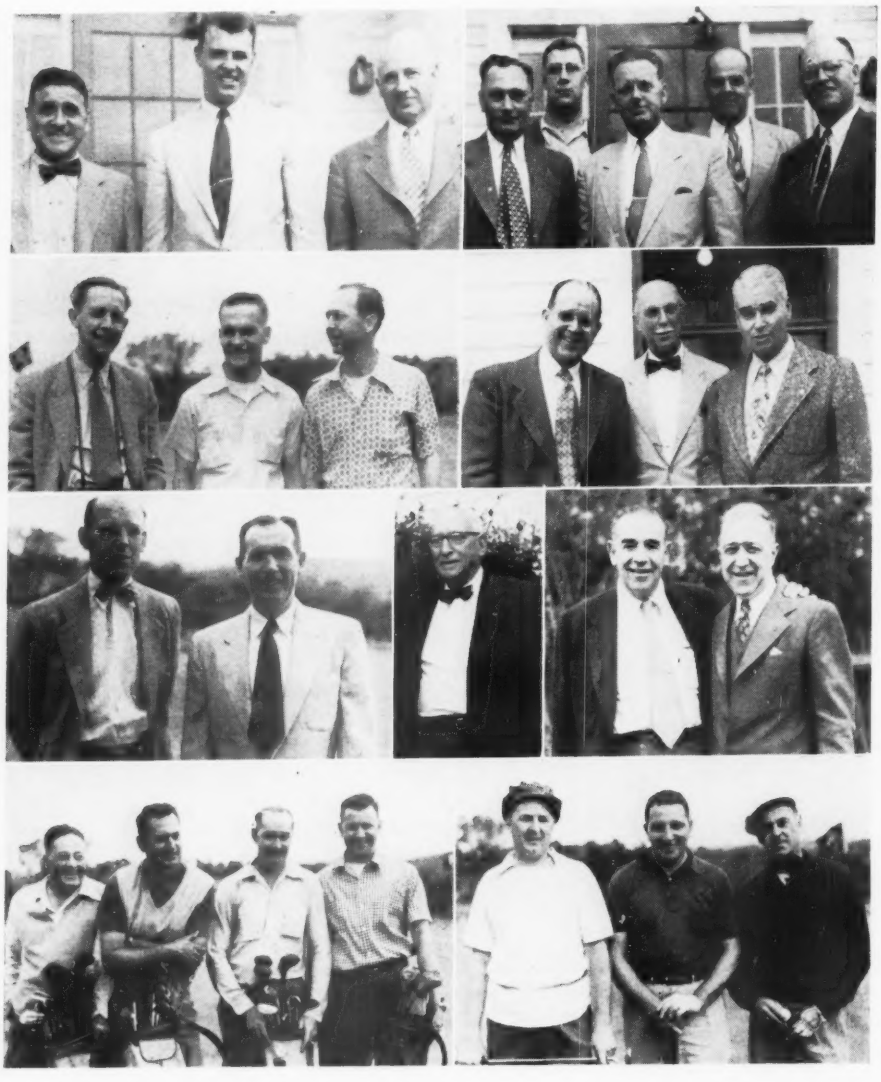
Other Subsidiaries:

Jeffers Electronics, Inc. • Speer Resistor Corp.

SAGINAW VALLEY Chapter of the AFS met Apr. 3 at Frankenmuth, Mich., to hear W. W. Levi, Lynchburg Foundry Co., Lynchburg, Va., speak. Left to right are: Albert Edwards, Chevrolet Gray Iron Division, General Motors Corp., chapter chairman; Mr. Levi, and Woodrow Holden, Eaton Mfg. Co. Photo by Kenneth Priestley, Vassar Electroloy Co.

(*Continued from page* 172)
the need for better than average sand control if resin binders are to be successfully used. Stickiness of oil mixtures can be handled using metal coreboxes. Wooden boxes with shellac coatings cannot be used with resin bonded core mixtures. Often in beginning to use urea resins, skin irritations appear but vanish after a week or two.

Two group discussions were organized following Mr. Murray's talk. One led by Lloyd King, King Foundry Inc., dealt with equipment featured at the recent Atlantic City foundry show; the other dealt with metallurgy and pattern practice and was led by Richard Wilson and Joe Costello, both with American Hoist & Derrick Co., St. Paul.—*J. D. Johnson, Archer-Daniels-Midland Co.*



NEW ENGLAND Foundrymen's Association held its annual outing at Marlborough, Mass., June 11. Top row, left to right, are: Al Angelone, Harry Sleicher and Jack Orrok, and the association executive committee: Frank Elliot, Al Nutter, Henry Stenberg, Gordon Paul and Howard Nye. Second row: Athi Erkkinen with two friends and Al Wright, Harold Dorus and Harold Prindle. Third row: Robert Walker, Bill Baughton, Harry Impey, Herb Klein and Jack Crotty. Bottom row: Ed Zimmerman, Hank Frechette, Romeo Lamoine, Blair Witham, Bud Jahn, George Liff and Cliff Randall. Photos of the outing are by courtesy of C. A. Wyatt, Debevoise-Anderson Co., Boston

Western New York

OFFICERS for the next chapter year were elected at the May 16 meeting of the Western New York Chapter of AFS held at Hotel Sheraton, Buffalo. Newly elected are: Chairman, Carl Harmon, Hanna Furnace Corp.; and vice chairman, Joseph Clifford, Bison Castings Inc. Secretary Roger Walsh, Hickman, Williams & Co., and treasurer, Martin Pohlman, Pohlman Foundry Co. Inc., were re-elected.

Directors elected to serve three years are: Tom Malloy, Buffalo Pipe & Foundry Corp.; Lynn Roberts, Combined Supply & Equipment Co. and Robert Forest, Lakeside Bronze Inc. Fred Goerke, Standard Buffalo Foundry Inc., was elected to serve as a director for one year and Erwin Deutschlander, Worthington Corp., as retiring chairman, will also serve as a director for one year.

Alfred A. Diebold, Atlas Steel Casting Co., presented the past chairman's pin to Mr. Deutschlander who expressed his appreciation for the co-operation of his fellow officers during the past year. A smorgasbord dinner preceded the meeting.—*M. E. Taublieb, Frederic B. Stevens Inc.*

Ontario

BOARD of directors of Ontario Chapter of the AFS met recently to plan a program of activities for 1952-53. Andrew Reyburn, Cockshutt Plow Co., Brantford, is the new president. Vice president is Alexander Pirrie, Standard Sanitary & Dominion Radiator Ltd., Toronto. Gerald L. White, Westman Publications Ltd., Toronto, continues as secretary-treasurer.

Educational Committee under W. A. Jones, its chairman, assisted by J. Hughes and J. Perkins, vice chairmen, met separately and drafted plans for a three-year course for foundrymen to start in the fall. Course will have classes in Brantford, Hamilton, To-

(*Continued on page* 176)

"We've more than Doubled Core Production with relatively no rejects" —says Foundry Head

DESPATCH

TOWER TYPE

CORE OVEN

installed at Progress Pattern and Foundry Co., St. Paul, Minn.

As many as eight tons of sand per eight-hour day can be handled in the modern core making layout at Progress Pattern. Cores of top quality and uniformity for all shapes of brass and aluminum castings are baked in this DESPATCH gas fired, tower type oven with relatively no rejects reported.

"With 80% of our output now going for Defense production it would be impossible to meet the strict time schedules and rigid Government requirements without our high-producing core room equipment," says Progress Management. "For example, our conveyorized Despatch Core Baking Oven with its automatically controlled heat and automatically controlled time cycle eliminates completely the human element in core baking and gives us uniform high-quality cores with every load. With its continuous conveyor, this oven also makes it possible to produce more cores faster with fewer core driers."

Write for full information to Dept. N.

NOT TO BE OVERLOOKED in the tower type oven design is the saving in floor space. This oven with 21 conveyor racks extends up approximately 30 ft. It occupies about ¼ the floor space of a horizontal oven of equal capacity.

MODERNIZE YOUR FOUNDRY with DESPATCH CORE OVENS FOR MORE PROFIT

Despatch engineers are ready to help you with your foundry problems. They will offer advice, or will design, build and install equipment in your foundry that will provide speed, plus uniformity and economy in all your core baking and mold drying operations.

FIFTIETH ANNIVERSARY

DESPATCH OVEN COMPANY

MINNEAPOLIS OFFICE: 619 S.E. 8th Street

CHICAGO OFFICE: 4554 N. Broadway

Sales Offices in all Principal Cities

(*Continued from page* 174)
ronto and later in Windsor and London. It will include elementary work the first year, practical the second, and advanced foundry practice the third year.

Plans were completed for the chapter's tenth annual picnic to be held Sept. 12-13, at Fern Cottage, Lake Couchiching, Orillia, under chairmanship of F. J. Rutherford. Date planned will be less likely to conflict with holidays.—*F. J. Rutherford, Refractories Engineering & Supplies Ltd.*

Saginaw Valley

A CHALLENGE to Foremen" was the subpect of the talk presented by George A. Jacoby, director of personnel service, General Motors Corp., at the May 1 meeting of the Saginaw Valley Chapter held in Frankenmuth, Mich. Mr. Jacoby recently returned from an international labor conference held in Europe, and while there he visited various industrial plants. He observed many differences between the European worker and the American worker, and emphasized the role the foreman plays in influencing the attitudes and philosophies of the worker. A. J. Zahn, Eaton Mfg. Co., served as technical chairman and J. F. Smith, Chevrolet Gray Iron Foundry, GMC, introduced the speaker.

WESTERN NEW YORK Chapter of the AFS elected officers at its May 16 meeting in Hotel Sheraton, Buffalo. Shown, left to right, are: Alfred A. Diebold, Atlas Steel Casting Co., past chairman, presenting past chairman's pin to Erwin Deutschlander, retiring chairman, and Carl Harmon, Hanna Furnace Corp., newly elected chairman. Photo by Marve Taublieb, Frederic B. Stevens Inc.

During a short business meeting, the following were elected for the coming year: Chairman, Kenneth H. Priestly, Vassar Electroloy Products; vice chairman, F. James McDonald, Central Foundry Division, General Motors Corp.; secretary, Woodrow W. Holden, Eaton Mfg. Co.; treasurer, Lenwell A. Cline, Saginaw Foundries Co. Those elected directors are: Alfred E. Hilgeman, General Foundry & Mfg. Co.; G. A. Rogers, Almont Mfg. Co.; Carl F. Wood, Chevrolet Gray Iron Foundry, GMC; and Ormond Requadt, Dow Chemical Co.—*Roy S. Dahmer, Eaton Mfg. Co.*

EASTERN NEW YORK Chapter of the AFS met at Circle Inn, Lathams, N. Y., May 20. At right, left to right, Joe Grana, Vermont Foundries Inc., and Ralph L. Lee, General Motors, Corp., speaker of the evening, do a little pre-dinner entertaining. Below, left to right, are: Ed Lawrence, General Electric Co., chapter secretary-treasurer, Alec Andrew, American Locomotive Co., director; Leigh Townley, Adirondack Foundries & Steel Inc., vice chairman; Mr. Lee; Jack Waugh, General Electric Co., chairman; Leo Scully, Scully Foundry & Machine Co., director, and William Stevenson, Rensselaer Valve Co., membership chairman. Photos courtesy of Howard Bodwell, General Electric Co.

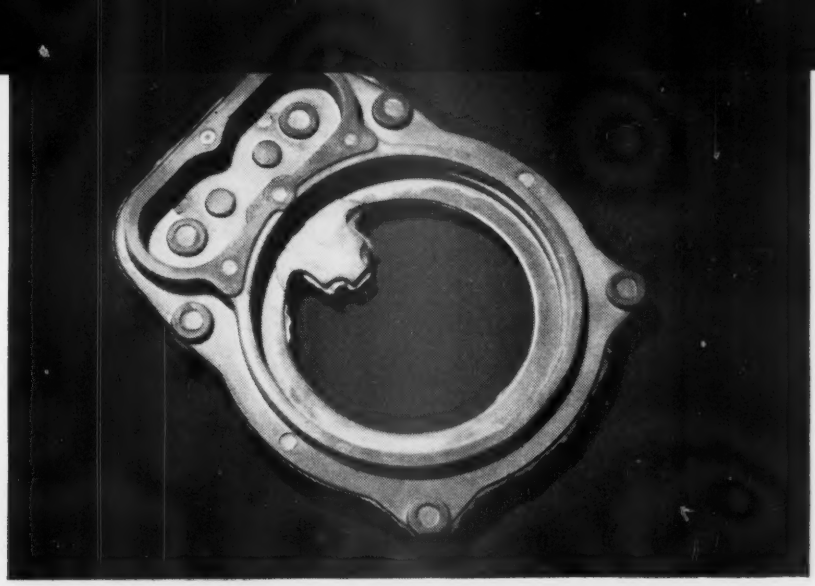
Tri-State

CONCLUDING technical meeting for the current season for Tri-State Chapter of AFS was held at Coffeyville, Kans., May 16. Speaker was George Halliwell, H. Kramer & Co., Chicago, who covered in as much detail as time would allow all major operations in the brass and bronze foundry. Of special interest to the group was his discussion of Battelle's work on the effect of mold materials on physical properties of red brass.

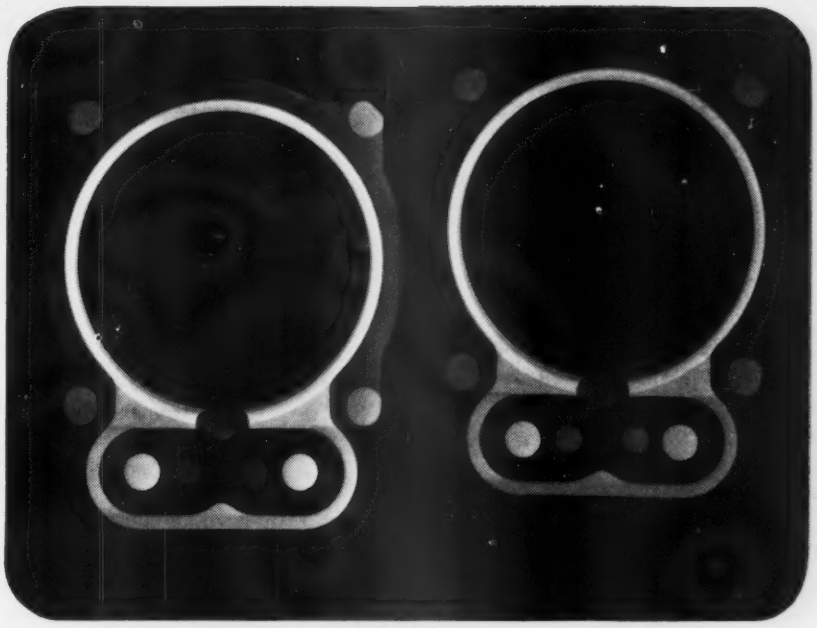
Mr. Halliwell believes with regard to melting techniques for brass and bronze that furnace atmosphere in itself is relatively unimportant provided the atmosphere used is under proper control at all times. He suggested several methods of checking melt quality prior to casting.

Before closing the meeting, the

(*Continued on page* 178)



This casting must accept responsibility



Radiograph of flight instrument part

—RADIOGRAPHY SAYS IT CAN

WHERE this casting goes, strains are measured in G's, speeds in machs, and altitudes in tens of thousands of feet. And the instrument of which it's a part must be sturdy and dependable to help guard the safety of a costly craft and human life.

So to be certain this part—together with other parts—is sound, it is radiographed. No flaws can lie hidden to cause failure—or to consume costly machining time before being discovered.

Radiographing castings is becoming routine in more and more progressive foundries. It lets them know that only high-quality castings are released. It frequently shows how casting methods can be changed to increase yield in production runs.

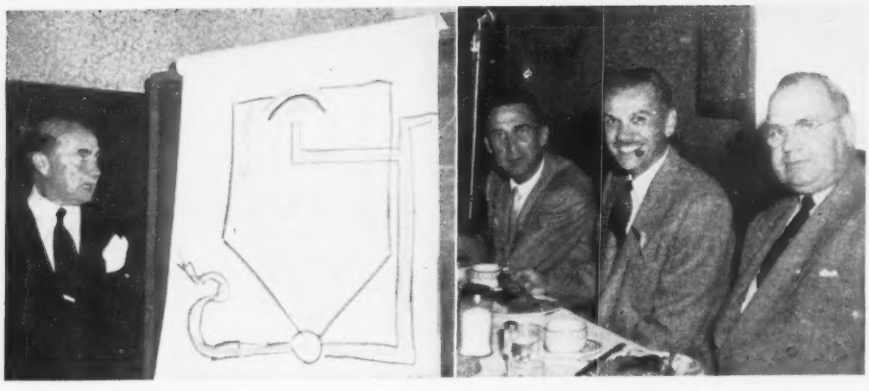
You can find out how radiography can improve operations in your plant by talking it over with an x-ray dealer. And we'll be glad to send you a free copy of "Radiography As A Foundry Tool."

Eastman Kodak Company • X-ray Division
Rochester 4, N. Y.

Radiography . . .

another important function of photography

Kodak
TRADE-MARK



SOUTHERN CALIFORNIA Chapter of the AFS met at Rodger Young auditorium, Los Angeles, May 23. Left to right, are: A. L. Gardner, Pangborn Corp., who presented a chalk talk on blast and impact cleaning equipment; Henry Howell, Howell Foundry Co., chapter president; Otto Rosentreter, Inesco Inc., who discussed cleaning room operation, and Hubert Chappie, National Supply Co., chapter secretary. Photos by Ken Scheckler, Calmo Engineering Co.

NORTHEASTERN OHIO Chapter of the AFS held old timers' and past presidents' night May 22 at Tudor Arms Hotel, Cleveland. Top views show two table groups. Center, J. F. Roth, Cleveland Standard Pattern Works Inc., chapter director, issues awards to apprentice contest winners. Bottom, F. Ray Fleig, Smith Facing & Supply Co., chapter treasurer, hands certificates to new members of the old timers' group. Photos by Tom Gallagher, Lake City Malleable

(*Continued from page* 176)

new chapter officers were introduced. They are: Clyde Beagle, Webb Corp., chairman; W. H. Harris, Frank Wheatley Pump Co., vice chairman; C. O. Beckitt, Progressive Brass Co., treasurer.—*J. G. Winget, Reda Pump Co.*

Lancaster-York

A DISCUSSION of the "Advantages and Disadvantages of Natural and Synthetic Sands," featured the concluding meeting of the current season for the Conestoga Foundrymen's Assocation. Held at the Outdoor Country Club, York, Pa. The meeting had 56 members and guests present to hear E. C. Troy, foundry engineer, Palmyra, N. J., the speaker.

Mr. Troy listed these ten factors as affecting the relative merits of natural and synthetic sands for foundry use: Initial cost; cost of unloading; cost of housing; cost of handling; cost of preparation; ease of molding; behavior at shakeout; reconditioning problems; quality of castings; and problem of old sand disposal.

The speaker stated that natural sands are generally cheaper to handle, particularly in small shops but that such sands are not suitable for all types of castings. He also said that good synthetic sands require less moisture than do the natural varieties but this highly desirable feature is obtained only if bonding materials are added to synthetic mixes with such accuracy that less water is possible.

In his experience he has found that all foundries which have changed from natural to synthetic sands are better satisfied and have no intention to return to their former practice. However, all are required to maintain close cotrol of their sands and perhaps this preference would be less sharply defined if controls and all other factors were equal.—*Robert F. Muhleman, Cochrane Foundry Inc.*

Northeastern Ohio

NORTHEASTERN Ohio Chapter of the AFS celebrated Old Timers' and Past Presidents' night May 22 at Tudor Arms Hotel, Cleveland. Officers and directors submitted for nomination at the April meeting and reported in June FOUNDRY, were elected.

Certificates were awarded to 19 new members of the old timers' group. They are: Carl Wichert, Cleveland Standard Pattern Works Co.; Sam Eskridge and Kazimerz Koprowski, Grabler Mfg. Co.; Frank J. Kiss, George Juhasz, John Gallina, and

(*Continued on page* 180)

DESULFURIZE with SODA ASH

It costs no more to get this Quality Soda Ash . . .

SOLVAY

Trade Mark Reg. U. S. Pat. Off.

DENSE SODA ASH

Want More Information on Equipment for Adding Soda Ash?

Efficient, economical, easy-to-operate equipment for feeding Soda Ash into molten iron for desulfurization is now available. We'll be glad to have our foundry consultant supply you with more information if you will give us details of your operation.

SOLVAY Alkalies Chemicals Since 1881

Especially Designed for Desulfurization

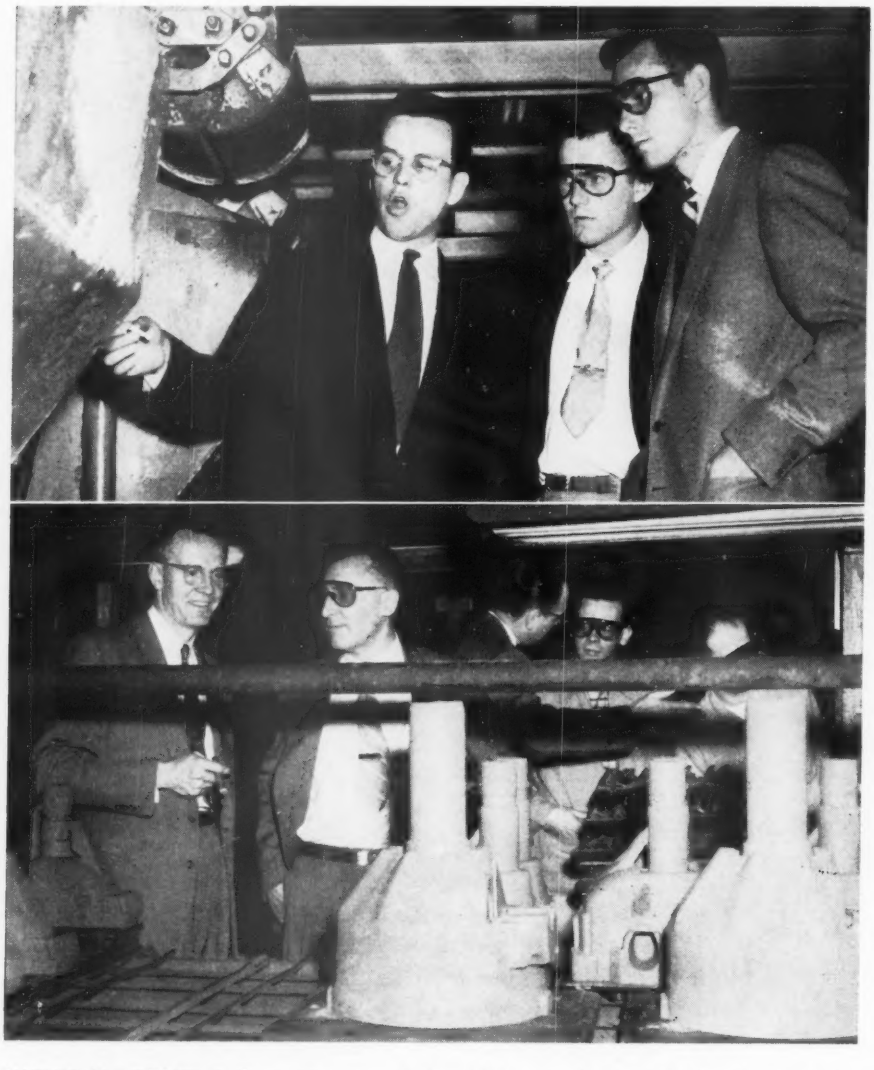
* Medium Grain Size
* Dustless
* High Chemical Purity

Technical Assistance Available—if you have sulfur problems with your grey or malleable iron castings, we invite you to write to SOLVAY's foundry consultant. There is no charge or obligation for this service.

SOLVAY PROCESS DIVISION
ALLIED CHEMICAL & DYE CORPORATION
61 Broadway, New York 6, N. Y.

BRANCH SALES OFFICES:
Boston • Charlotte • Chicago • Cincinnati • Cleveland • Detroit
Houston • New Orleans • New York • Philadelphia • Pittsburgh
St. Louis • Syracuse

EDUCATIONAL COMMITTEE of Northwestern Pennsylvania Chapter of the AFS was instrumental in producing a 30-minute narrated slide film, "A Career in Metal." It depicts advantages of the foundry industry and is adaptable for showings at schools, colleges, parent-teacher meetings and before civic and professional groups. Left to right are: Roger Griswold, Erie Malleable Iron Co.; John Clarke, General Electric Co.; Joseph Shuffstall, National-Erie Co. Division, Bucyrus Erie Corp., and Earl M. Strick, Erie Malleable Iron Co., chairman



MICHIGAN STATE College chapter of the AFS toured Central Foundry Division, General Motors Corp., May 18. Department supervisors acted as guides for the students. After the tour, the group participated in question and answer session, and Plant Manager Vern Righter accepted the chapter's invation to serve as one of its industrial advisers next year. Ernest Frens, chapter president, expressed the group's appreciation for a fine, educational evening

(*Continued from page* 178)

Otto Suche, Fulton Foundry & Machine Co.; Joseph Roth, Florian Kreber, Frank Kovacic, Peter Marinatt, and John Prah, Cleveland Punch & Shear Works; John Helmich, Joe Memich, Andrew Sernal, Joseph Brodowski, Charles Martin, and Frank Rossy, Lake City Malleable Co., and Walter Michalek, Westinghouse Electric Corp. Eligible old timers must have 40 years foundry service.

Past presidents attending the meeting and new officers and directors were introduced, then the meeting was adjourned for presentation of an entertaining stage show.

Members and guests of Northeastern Ohio Chapter of the AFS held their annual outing June 21 at Twin Lakes Country Club near Kent, O. In the golf department, first prize was taken by Mr. Moone, a guest, with a 69. Richard E. Joyce, Abrasive Tool & Supply Co., Cleveland, took second with a 71.

The foundrymen won the annual softball grudge game from the vendors with a score of 30 to 5. That was in the first half of the sixth inning when the game broke up. After dinner, which was served in a glass-walled dining room overlooking a beautiful inland lake, golf and door prizes were awarded to conclude the days activities.—*Robert H. Herrmann*

Southern California

THE May 23 meeting of the Southern California Chapter of AFS, held at the Rodger Young Auditorium, Los Angeles, was the concluding session of a three-day meeting on cleaning room practices. Guests of the chapter were essay contest winners and their instructors from several southern California city and junior colleges.

Following presentation of the winners in the contest, the first speaker, Ralph Trent, Pangborn Corp., was introduced. Mr. Trent spoke on impact cleaning and equipment. He explained the differences between sand blasting, shot and abrasive cleaning, pointing out the uses and limitations of each. He then introduced A. L. Gardner, also of Pangborn, who presented a chalk talk, coupled with slides to illustrate the history and consequent development of blast and impact cleaning equipment.

Mr. Gardner showed how important the cleaning room is to a foundry in regard to production, quality and in reducing manpower. Many types of cleaning equipment were shown and explained, emphasizing both their good and bad points. Otto Rosentreter, Inesco Inc., then discussed the

(*Concluded on page* 183)

GREFCO BASIC BRICK For All Industry

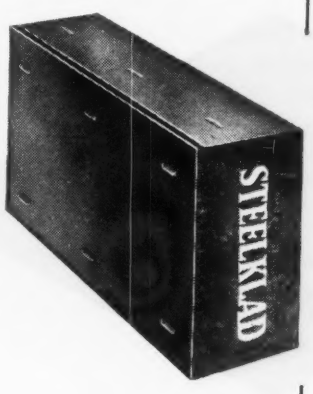
The metallurgical industry demanded furnace linings capable of withstanding extremely high temperatures under extraordinary operating conditions. To meet this challenge, Grefco research produced the famous RITEX unburned basic brick—one of the outstanding advances in the entire history of brick manufacture. RITEX brick possess great accuracy to specified dimensions. They are more resistant to thermal spalling ... offer lower porosity, lower thermal conductivity, and higher hot strength. These properties insure increased service at reduced cost.

STEELKLAD For Tough Duty

For service too tough even for RITEX, Grefco offers STEELKLAD, an unburned basic brick, permanently jacketed in a patented steel shell. The brick will not slide from its shell in the construction of a furnace wall. When the furnace is heated the steel oxidizes and is absorbed by the brick. It provides an exceptionally efficient monolithic lining that outlasts all other brick in basic open-hearth steel furnaces, electric-arc furnaces, soaking pits, copper smelting and refining furnaces, and other basic metallurgical furnaces.

Take A Look At STEELKLAD

Shown below is a typical STEELKLAD basic brick, steel-jacketed on the four major faces, and containing Grefco's unburned magnesite-chrome brick. The brick itself is exclusive and patented—as is the permanent steel shell. It may mean major savings in your operation. Write, wire or phone General Refractories in Philadelphia—or contact your nearest dealer.



Money... made with brick!

WHATEVER YOU BUY—IT'S BECAUSE OF BRICK!

Refractory brick, the only product capable of lining the furnaces that produce the silver, nickel and copper for our coins—the paper for our dollar bills. And, most everything we buy with our money also owes its origin, in part, to refractory brick.

SUCH REFRACTORY BRICK AS RITEX AND STEELKLAD popular basic brick made by General Refractories Company for virtually all metallurgical furnaces. These leading favorites are exceptionally capable of resisting destructive forces—providing long life at high temperatures.

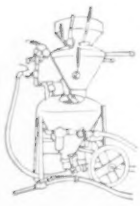
66 GREFCO MINES AND MANUFACTURING PLANTS, here and overseas—together with 18 sales offices, hundreds of distributing agencies, and the most modern of research facilities—deliver a truly *complete refractories service.*

FOR BASIC, FIRECLAY OR SILICA BRICK—MORTARS, CASTABLES OR BULK REFRACTORIES—CALL ON GREFCO!

GENERAL REFRACTORIES COMPANY

PHILADELPHIA

Cupoline for your Cupolas...



Cupoline Bondact Mix is proportioned for use in the Bondact machine. This combination makes contour patching simple, ends uncertainties of hand mixes, avoids joints and weak points. Moisture is easily controlled.

PUT CUPOLINE TO WORK WITH THE BONDACT MACHINE

Cupola patching with the BONDACT machine using Cupoline refractory is a continuous story of substantial savings. Smaller cupolas can be patched in as little as 10 minutes and the average cupola in less than 30 minutes.

Save yourself many cupola headaches. Get actual case histories of money-making conversion to the Bondact air placement method of patching cupolas. . . Better service than ever from three shipping points.

EASTERN CLAY PRODUCTS
DEPARTMENT
International Minerals & Chemical Corporation — 20 NORTH WACKER DRIVE, CHICAGO 6

E C P Since 1926

QUALITY, SERVICE, DEPENDABILITY, PROGRESS

Minerals International Chemicals

DIXIE BOND • BLACK HILLS BENTONITE • TRIPLACT • REVIVO CORE PASTE
REVIVO BOND • BONDACTOR • CUPOLINE • DURA PRODUCTS • WESTONITE

Walter L. Seelbach (left) retiring president of AFS, with W. A. Nugent, Independent Pneumatic Tool Co., at the International Foundry Congress

(*Concluded from page* 180)

flow of castings from shakeout to shipping room and pointed out the importance of the cleaning room in all foundries. He believes most foundries have inadequate cleaning rooms served by old and improper equipment and that many times manpower is wasted there. Mr. Rosentreter admitted that although complete mechanization of all foundries is not possible, many need to modernize their cleaning rooms.—*Alfred A. Grant, Grant & Co.*

New Jersey

VARIOUS provisions of the wage stabilization regulations were discussed by Arthur White, chairman of the New York and New Jersey regional Wage Stabilization Board, at the monthly meeting of the New Jersey Foundrymen's Association, Military Park Hotel, Newark, N. J., May 19. A lively question and answer period followed. H. L. Edinger presided as president.—*Ben K. Price.*

Northwestern Pennsylvania

FIRST Fathers' and Sons' Night was held by the Northwestern Pennsylvania Chapter of AFS, May 26. Its pronounced success has insured its being an annual affair. The meeting provided the answer to making an educational meeting successful and an opportunity to interest more young men in the foundry industry. Nearly 50 orphan boys were adopted for the evening by a similar number of foundrymen who had no sons within the age brackets.

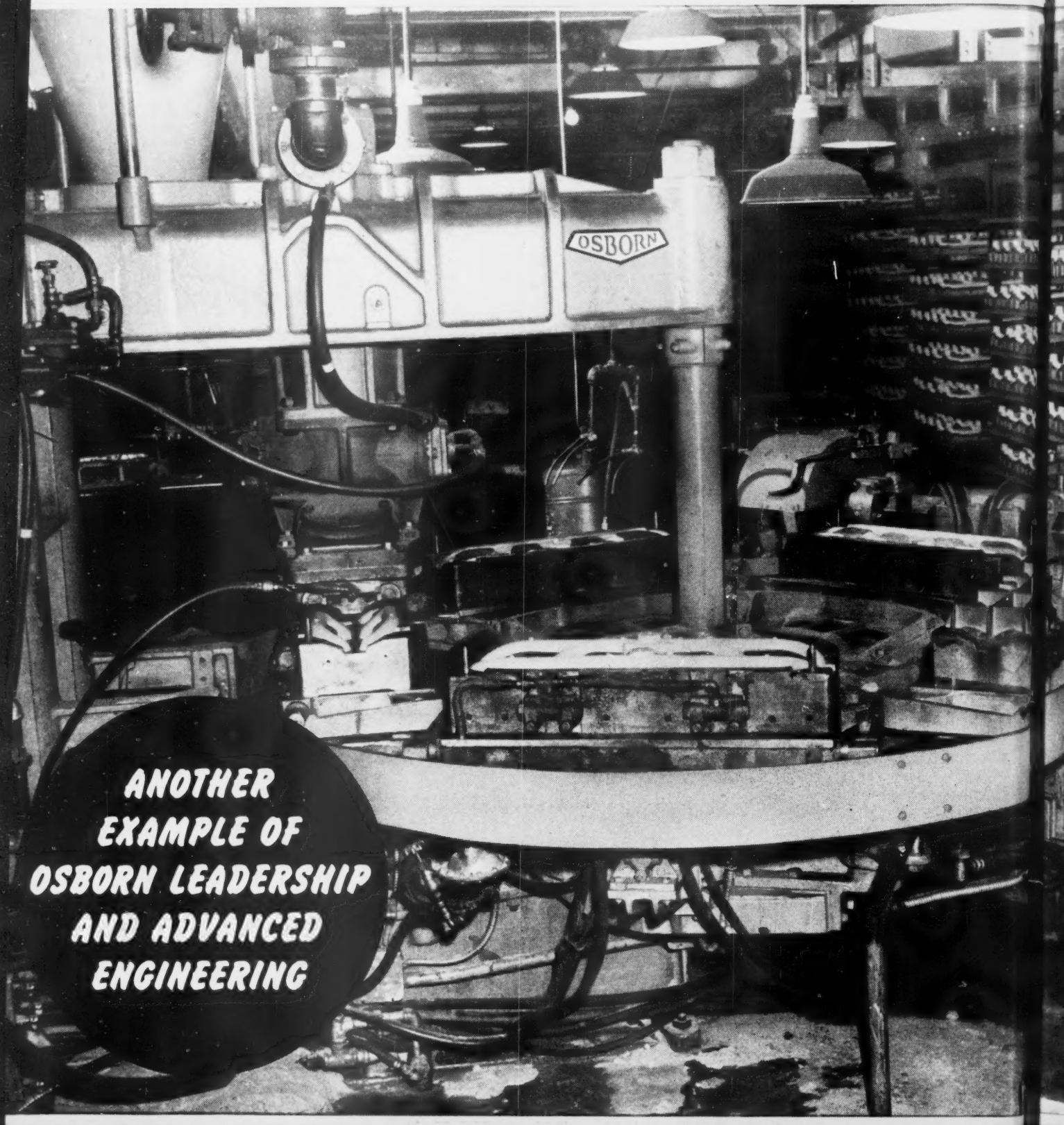
The boys were treated to cokes, a dinner with a hill billy band to furnish music, a songfest to release some of the boys' excess energy, and then a showing of the chapter's new slide film entitled "A Career in Metal." The evening was concluded with a talk by Max Darone, secretary of the YMCA, entitled "My World's Championship Baseball Team of All Time."

The chapter was host to top management of foundries in the chapter's district at a luncheon on June 5 when the film was exhibited again.

Fred Carlson, Weil-McLain Co., Erie, was elected the chapter's chairman for the 1952-53 season. Charles Gottschalk, Cascade Foundry, Erie, is the new vice chairman. Directors are: Douglas James, Cooper-Bessemer, Grove City, Pa.; Dick Strong, Griswold Mfg. Co., Erie; James Donnelly, Peerless Sand Products Co., Conneaut, O.; and Duane Keep, K & L Refractories Service Co., Erie, Pa. —*Roy Loder, Erie Malleable Iron Co.*

CENTRAL INDIANA Chapter of the AFS celebrated past chairmen's night May 19. At top, are: Allen Evans, International Harvester Co., Indianapolis, technical chairman (left) and George Anselman, Beloit Foundry Co., Beloit, Wis., principal speaker. Past chairmen are shown below. Front row, left to right: I. R. Wagner, Electric Steel Castings Co., Indianapolis, and S. Franklin Swain, Golden Foundry Co., Columbus Ind. Back row: Allen Reid, General Refractories Co., Indianapolis, and Robert Langsenkamp, Langsenkamp-Wheeler Brass Works, Indianapolis. Photos by Henry O. Yeager, International Harvester Co.

NEW OSBORN ROD



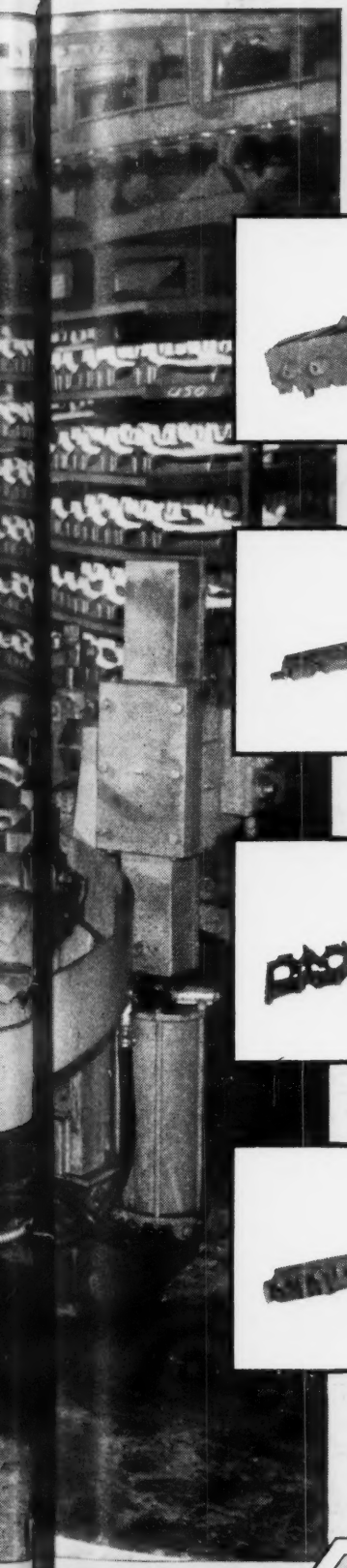
ANOTHER EXAMPLE OF OSBORN LEADERSHIP AND ADVANCED ENGINEERING

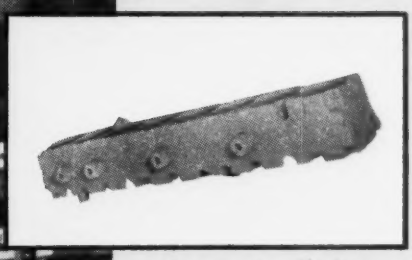
THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue Cleveland 14, Ohio

TO-CORE AUTOMATIC

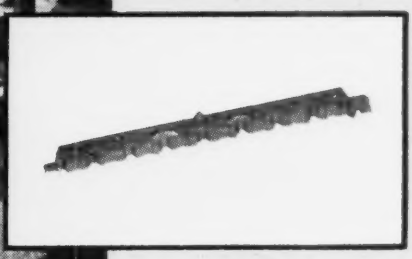
Cuts core blowing costs

OVER 60%

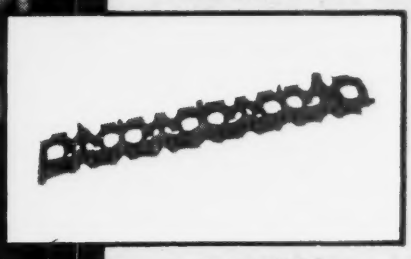




Automotive Block
Jacket Core



Upper Half
Head Jacket Core



Lower Half
Head Jacket Core

Cylinder Head
Side Slab

- Blows over 300 core boxes per hour . . . automatically
- Produces uniform high-quality cores
- Requires less operator effort and training

OSBORN ROTO-CORE AUTOMATIC

- Blows the cores
- Draws the cores
- Handles the core box

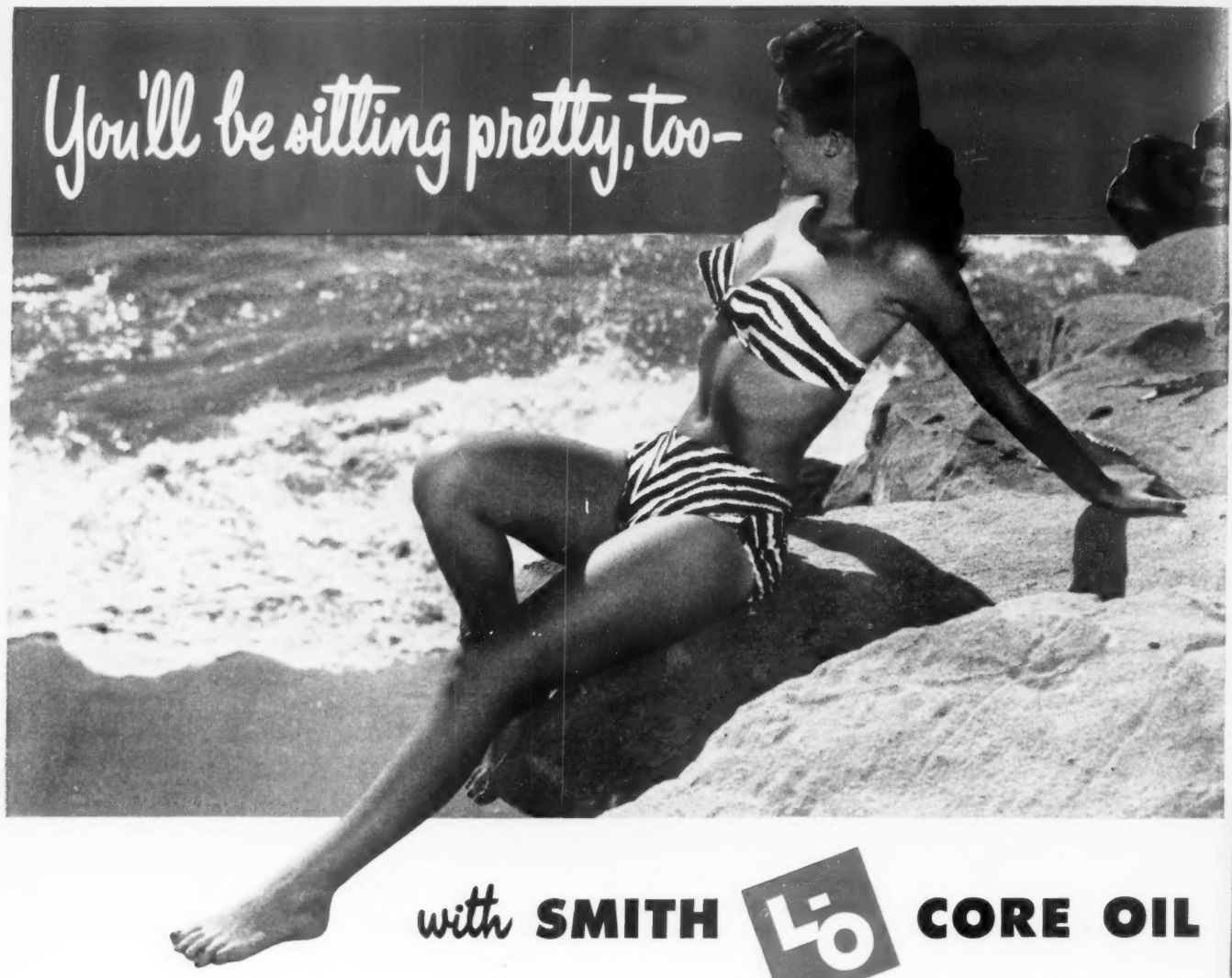
REPETITIVE AUTOMATIC OPERATING CYCLE is adjustable to suit a wide range of individual jobs and types of production. One operator positions drier plates while the other operator racks finished cores. Make-ready stations are available for setting core wires, blowing out boxes and other make-ready operations without limiting production.

Get Full Details. Call or write *The Osborn Manufacturing Company, 5401 Hamilton Ave., Cleveland 14, Ohio.*

OSBORN®

MOLDING MACHINES · CORE BLOWING MACHINES · INDUSTRIAL BRUSHES

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA



with SMITH L-O CORE OIL

WAREHOUSE STOCKS
AVAILABLE
In The Following Cities

- COLUMBIAN WAREHOUSE CO. Reading, Pennsylvania
- FOUNDRIES MATERIALS CO. Coldwater, Michigan
- FOUNDRY SERVICE CO. Birmingham, Alabama
- THE FOUNDRY SUPPLY CO., INC. Minneapolis, Minnesota
- F. F. SHORTSLEEVE Elmira, New York
- MALCOLM G. STEVENS Arlington, Massachusetts
- PACIFIC GRAPHITE CO., INC. Los Angeles 22, California
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. (formerly M. W. Warren Coke Co.) St. Louis, Missouri
- WESTERN FOUNDRY SAND CO. Seattle, Washington
- WESTERN INDUSTRIAL SUPPLY CO. Portland 14, Oregon

Put Smith L-O Core Oil on the job and you'll notice an appreciable gain in savings of time and effort, as well as production of clean, accurate cores. Regardless of your foundry set-up—whether jobbing or production . . . using ferrous or non-ferrous metals—you can order a grade of Smith L-O ideally suited to your needs.
Order this quality binder from the representative nearest you, and know first hand why others consider Smith L-O a superior core oil.

Smith L-O Core Oil

ROD DIP LIQUID PARTING

SMITH OIL & REFINING CO.
MANUFACTURERS OF L-O AND CERTIFIED CORE OILS
INDUSTRIAL OILS DIVISION . . . ROCKFORD, ILLINOIS

PROPOSED TENTATIVE

SPECIFICATIONS FOR HEAVY-WALLED CARBON AND LOW ALLOY STEEL CASTINGS FOR STEAM TURBINES

ASTM Designation: A—52T

Issued, 1952

Scope

1. These specifications cover ferritic steel castings for cylinders (shells), valve chests, throttle valves, and other heavy-walled castings for steam turbine application.

NOTE.—The purpose of these specifications is to make provision for steel castings for steam turbines in which the wall thicknesses are usually over 1 in. Such castings are normally poured at moderate temperatures in dry sand molds. The committee formulating these specifications does not recommend their application to thin-walled castings which are normally poured at relatively high temperatures in green sand molds.

Process

2. (a) The steel shall be made by the open-hearth or electric-furnace process.

(b) The use of aluminum is prohibited in the manufacture of the steel for all grades except grade 1; however, by agreement between the manufacturer and the purchaser, the restriction on the use of aluminum in the manufacture of the steel for any grade may be waived.

These Tentative Specifications have been approved by the sponsoring committee and accepted by the Society in accordance with established procedures, for use pending adoption as standard. Suggestions for revisions should be addressed to the Society at 1916 Race St., Philadelphia 3, Pa.

Heat Treatment

3. (a) The castings may receive such preliminary heat treatment as the manufacturer may elect to employ. For the purpose of developing the final characteristics of the castings, the heat treatment shall consist of normalizing and tempering. In the event of welding (Section 16), or when agreed between the manufacturer and the purchaser, stress-relief heat treatment shall be employed.

(b) The procedure for normalizing shall be as specified in the Tentative Definitions of Terms Relating to Heat Treatment of Metals (ASTM Designation: E 44), which requires that castings are to be heated to a temperature above the transformation range and subsequently cooled in still air at room temperature.

(c) The procedure for tempering (drawing) shall be as specified in Tentative Definitions E 44, which requires reheating of the normalized castings to a temperature below the transformation temperature range, followed by any desired rate of cooling. The temperature employed shall not be less than 1100 F for all grades except grade 1.

(d) The procedure for stress relieving shall be as specified in Tentative Definitions E 44, which requires reducing internal stresses in a metal object by heating the object to a suitable temperature and holding for a proper time at that temperature. This treatment may be applied to relieve stresses induced by casting, quenching, normalizing, machining, cold working, or welding.

Table I—Chemical Requirements

Grade	1	2	3	4	5	6	7	8	9	10
Material	Carbon Steel	½ per cent Molybdenum	1 per cent Molybdenum	1 per cent Molybdenum, Vanadium	½ per cent Chromium, ½ per cent Molybdenum	1 per cent Chromium, ½ per cent Molybdenum	1 per cent Chromium, ½ per cent Molybdenum, Vanadium	1 per cent Chromium, 1 per cent Molybdenum	1 per cent Chromium, 1 per cent Molybdenum, Vanadium	2¼ per cent Chromium, 1 per cent Molybdenum
Carbon, max, per cent	0.35[a]	0.25[a]	0.25	0.20	0.25[a]	0.20	0.20	0.25	0.20	0.20
Manganese, per cent	0.70	0.70[a]	0.50 to 0.80	0.50 to 0.80	0.70[a]	0.50 to 0.80	0.50 to 0.80	0.50 to 0.80	0.50 to 0.80	0.50 to 0.80
Silicon, max, per cent	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Phosphorus, max, per cent	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Sulphur, max, per cent	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Molybdenum, per cent	....	0.40 to 0.60	0.90 to 1.20	0.90 to 1.20	0.40 to 0.60	0.40 to 0.60	0.40 to 0.60	0.90 to 1.20	0.90 to 1.20	0.90 to 1.20
Chromium, per cent	....	....	....	....	0.40 to 0.70	1.00 to 1.50	1.00 to 1.50	1.00 to 1.50	1.00 to 1.50	2.00 to 2.50
Vanadium, per cent	[b]	[c]	....	0.15 to 0.25	....	....	0.15 to 0.25	....	0.15 to 0.25	....

[a] For each 0.01 per cent reduction in carbon below the maximum specified, an increase of 0.04 per cent manganese over the maximum specified for that element will be permitted up to 1.00.

[b] Vanadium 0.01 per cent minimum may be specified, or up to 0.05 per cent permitted.

[c] Vanadium 0.05 per cent minimum may be specified.

PROPOSED TENTATIVE

SPECIFICATIONS FOR HEAVY-WALLED CARBON AND LOW ALLOY STEEL CASTINGS FOR STEAM TURBINES

ASTM Designation: A—52T

Issued, 1952

Chemical Composition

4. The castings shall conform to the requirements as to chemical composition prescribed in Table I.

Ladle Analysis

5. An analysis of each heat of steel shall be made by the manufacturer to determine the percentage of the elements prescribed in Table I. This analysis shall be made from drillings taken not less than ¼-in. beneath the surface of (1) the test sample taken during the pouring of the heat, or (2) from a casting representing the heat. The chemical composition obtained shall conform to the requirements prescribed in Table I, and shall be reported to the purchaser.

Check Analysis

6. An analysis may be made by the purchaser from a broken test specimen or from a casting representing each heat. Drillings for analysis shall be taken not less than ¼-in. beneath the surface, in such a manner as not to impair the usefulness of the casting selected for such check analysis. The chemical composition thus determined shall conform to the requirements prescribed in Table I.

Tensile Properties

7 (a) The castings shall conform to the requirements as to tensile properties prescribed in Table II.

(b) The yield point shall be determined by the drop of the beam or the halt in the gage of the testing machine, or by the use of dividers, or by an extensometer at a crosshead speed not in excess of ⅛-in. per min. Where a definite yield point is not exhibited, the yield strength corresponding to an offset of 0.2 per cent, the yield strength corresponding to an extension under load of 0.5 per cent, or the yield strength determined by any other means mutually agreeable to manufacturer and purchaser may be substituted. The methods described in the Tentative Methods of Tension Testing of Metallic Materials (ASTM Designation: E 8) shall be followed. The tensile strength shall be determined at a speed of head not to exceed 1 in. per min.

Test Coupons

8. (a) Tension test specimens and samples for microexamination may be taken from coupons conforming substantially to the dimensions shown in Fig. 1 and from the locations in the coupon as indicated in Fig. 1. These coupons shall have been cast attached to the castings, except as provided in Section 8(b), and have remained attached, without partial severing, until the completion of the foundry heat treatment.

(b) If in the opinion of the manufacturer, the design of any casting is such as to preclude the use of an attached coupon, then the tension test specimen and sample for microexamination for that casting may be taken from a coupon attached to a special block. This coupon shall conform substantially to the dimensions shown in Fig. 1 and shall have remained attached, without partial severing, to its special block until after all foundry heat treatment.

(c) Tension test specimens shall be machined to the form and dimensions shown in Fig. 2.

(To be concluded in September issue)

Table II—Tensile Requirements

Grade	1	2	3	4	5	6	7	8	9	10
Material	Carbon Steel	½ per cent Molybdenum	1 per cent Molybdenum	1 per cent Molybdenum, Vanadium	½ per cent Chromium, ½ per cent Molybdenum	1 per cent Chromium, ½ per cent Molybdenum	1 per cent Chromium, ½ per cent Molybdenum, Vanadium	1 per cent Chromium, 1 per cent Molybdenum	1 per cent Chromium, 1 per cent Molybdenum, Vanadium	2¼ per cent Chromium, 1 per cent Molybdenum
Tensile Strength, min, psi	70,000	65,000	80,000	90,000	70,000	70,000	70,000	80,000	95,000	85,000
Yield Point, min, psi	36,000	35,000	50,000	60,000	40,000	45,000	40,000	50,000	60,000	55,000
Elongation in 2 in., min, per cent	20.0	22.0	18.0	16.0	22.0	22.0	22.0	18.0	15.0	20.0
Reduction of Area min, per cent	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0

"Dag" Dispersions Assist Parting, Give Smoother Castings, Cause No Smoke

Apply **"dag"** colloidal graphite dispersions to molds, chills, patterns, cores, push pins, shoulder screws, flask pins ... even ladle interiors ... for clean, quick parting and smoother castings.

An application of **"dag"** colloidal graphite will produce an unusually slippery dry film. The film so formed is virtually unaffected by heat, and is so thin that critical casting tolerances are not affected at all.

Molds and patterns so treated give superior reproduction. Less finishing of castings is required, often none at all. Rejects are fewer and inspection takes less time. Mold life is lengthened.

Aqueous **"dag"** dispersions also improve shop conditions by eliminating or reducing the fumes and smoke usually caused by petroleum-base parting compounds.

The use of **"dag"** colloidal graphite in the foundry is explained fully in a new bulletin, available without obligation. Write today for Bulletin No. 425-14H.

dag DISPERSIONS®

Acheson Colloids Company, Port Huron, Mich.

Units of Acheson Industries, Inc.

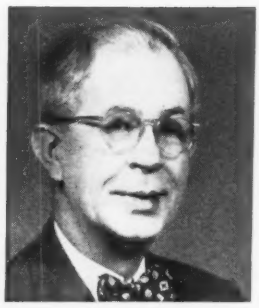
... also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

MAN-TO-MAN

on the Molder's Bench

"Impressions—True or False"

By RALPH L. LEE



THE Lee Hobby organization is all a twitter with the news that Max Kuniansky and Tom Curry of the Lynchburg Foundry are coming to visit the plant. Although some semblance of good housekeeping has always been the order of the day, I had all I could do to keep from going all out at putting a polish on the place clear out of keeping with the work done.

I realized, of course, that if Max and Tom, who practice good housekeeping themselves, should walk into the Lee Hobby Foundry and find the floors waxed, the windows sparklingly clear, not a speck of dust on the lamp shades and the bottomboards varnished, they'd know darned well that all we were doing was trying to make an impression and one that was not entirely honest.

At this point the vice president in charge (Mother, Mrs. Lee) chimed in with a quote she'd dug up some place—"If you try to make an impression—that's exactly the impresison you will make."

All of which swung the old memory back over the years to my National Cash Register days and to one of the many occasions when news was flashed throughout the plant that the president—none other than the one and only John H. Patterson—was scheduled to go through the plant. This he invariably did after his long and many visits to Europe.

After the first break of the news, production literally stopped for a spell while everybody and his uncle grabbed up a broom, soap, water, metal polish, brushes, chamois or a rag and went to town renovating, sterilizing, buffing and polishing what already was one of the cleanest and most orderly plants in existence at that time.

I never had the chance or the nerve to ask John H. whether he could or could not see through all of the shenanigans the organization went through in preparation for his coming; whether he considered them a token of their esteem for him, a demonstration of their fear of him or of a suspicion that he couldn't trust them the minute his back was turned.

Maybe there was something to having the britches scared off of a gang to get a super-duper housecleaning into motion. But I must say that even if there was, the idea always left a bad taste in my mouth, and still does for that matter.

Quite some time back I visited a wonderfully laid out and equipped foundry a day or two after the organization got wind of the coming visit by the top-notch executive in charge not only of this particular plant but several others like it. Now I know it's just human nature to wash your face, comb your hair and put on a clean shirt when company is coming. But I also know that the more worthwhile that company is, the more uncomfortable they'll be if they find their hosts all on edge in an hysterical effort to put on the dog. I also know that a good guest is one who likes to make his host feel at home.

In my opinion this foundry gang had every right to feel honored at the visit of their distinguished visitor, but from what I saw they seemed to be going overboard in almost a frantic effort to do what they imagined would make the biggest hit with him in the short time they were going to be with him.

I couldn't help but think that in their effort to psychoanalyze him for his weak spots, so they could play all of their cards on those spots, they might easily make the wrong guess and slight the very phases of their operation the executive had really come to see.

I hadn't meant to get into this subject so deeply but I could hardly help myself, for I have seen so many (far too many) organizations with the jitters trying to walk a tight rope teetering between the fear of displeasing the higher ups or wobbling on the same rope in awkward efforts to make a hit with him.

Really, I don't see how any one can spend very much time researching the boss for his personal weak spots and vanities and have enough time left over for researching the weak spots in the job the former was hired to do.

Tony, a very good friend of mine and one I'm proud to have (he's general manager now of a real operation), told me not so long ago while I was patting him on the back for the strides he'd made: "Doc! I see so many folks who are scared pink every time they get wind of a threatened visit of the higher-ups. You know me," he went on, "as one who doesn't scare very easy and as time goes on I scare even less.

"I honestly try to do the very best I can on this job all of the time. So any of my higher-ups are perfectly welcome to drop in on us any time they want to, whether they let us know they are coming or not.

"Now if when they get here, they find that the best I can do is not good enough, then I think they've got themselves the wrong man and the sooner I learn about it the better. For I'm a son of a gun if I'm going

(Concluded on page 192)

For increased production, dependability and safety, check your present portable grinding equipment against these Ingersoll-Rand features:

Overspeed Safety Coupling—If the regular governor, because of wear, abuse, improper adjustment, or dirty air, allows the motor to overspeed, the overspeed safety coupling automatically disconnects the arbor and the wheel from the motor.

Quieter Exhaust—It takes 10 of these Grinders to produce exhaust noise equal to that of one previous machine! This means increased operator morale and top grinding efficiency!

Extra Exhaust Positions—The operator can choose any one of four exhaust positions, so that the exhaust air does not strike the operator's body or hit the work and blow grit and metal particles about.

Easy to Carry—There is plenty of room behind the throttle lever for a comfortable grip. The Grinder may be easily and safely carried while it is connected to the air line.

More Power—A larger motor maintains higher speed under normal grinding loads to remove more metal in less time.

Optional Handle—The popular grip handle is interchangeable with a straight handle where the operator's preference or the job at hand calls for it.

Long Life Arbor Construction—Widely spaced, permanently lubricated ball bearings maintain rigidity and accurate alignment, assuring long life and trouble-free service.

Rubber-Faced Valve—For air economy the rubber-faced throttle valve seats better under all conditions, even with a dirty or pitted valve seat.

Call, write or wire your nearest Ingersoll-Rand office—one of our Grinder engineers will demonstrate what Operator Engineered Grinders can do on your jobs!

The Experience **GRINDER LINE BUILT...**

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 803-8

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

(*Concluded from page 190*)

to develop ulcers trying to do my full-time job and at the same time worry about which side of the bed my bosses happened to get out of this time."

There certainly can't be very much doubt left that the "Bull of the woods" tactics have gone out of style for not only foremen, but superintendents, managers and owners as well. Neither can there be any doubt that "cheese it the cops" and "apple polishing" have also gone out of style for everybody.

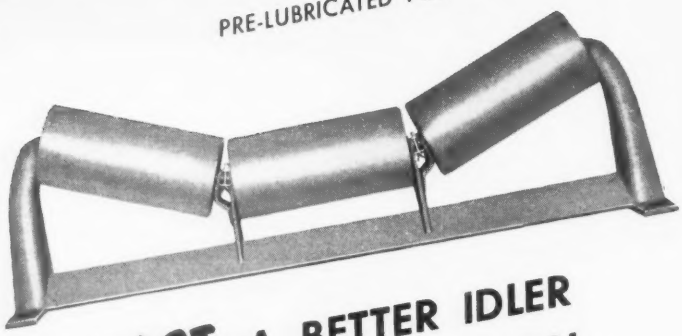
While I imagine that fear of displeasing and anxiety to please will always have a definite place in the scheme of things, I really believe that the job to be done has got to be the real boss. It seems to me that the most effective leaders and executives always recognize this and govern themselves accordingly. If everybody in an organization can be made to feel comfortably themselves while they do their particular part of the overall job and in the presence of anybody—either lowly or mighty—miracles can be performed. I've seen enough organizations in action to know for a fact that this is so.

In my opinion, rank worship and the fear they breed wreck more concerns and careers than all of the other pitfalls put together.

By the way, the Lee Hobby Foundry organization has gone over the plant once lightly in honor of Max Kuniansky's and Tom Curry's coming visit. We're not going overboard, for we feel quite sure that, in addition to our good housekeeping, they're going to see a number of things they're likely to write home about.

WITHSTANDS FOUNDRY HEAT
GREASE SEALED IN
DUST SEALED OUT

NO GREASING
PRE-LUBRICATED FOR LIFE



AT LAST-A BETTER IDLER
FOR SEVEREST SERVICE ON
FOUNDRY BELT CONVEYORS

378 DEGREES

Special Transall sealed-in lubricant withstands high foundry temperatures up to 378° F. without melting. Transall Pre-Lubricated Idlers will cure your belt conveyor troubles.

It will pay you to find out why so many foundrymen are replacing worn-out idlers with Transall *Pre-Lubricated* Idlers.

Bearings of Transall *Pre-Lubricated* Idlers are factory sealed. They never need re-lubricating. More important, perhaps, there is no leaking grease to destroy your conveyor belt and no abrasive dust can get in to destroy the idler bearings. Result: No lubrication cost, longer belt life, idlers last longer, maintenance costs less.

We also manufacture complete Pre-Engineered, Pre-Fabricated, Pre-Lubricated Sectional Belt Conveyor Systems. Write or Wire TRANSALL, INC., 105 North 11th Street, Birmingham 4, Alabama.

TRANSALL PRE-LUBRICATED IDLERS FOR BELT CONVEYORS

OBITUARY

FRED A. PRITZLAFF, 66, for 49 years associated with Falk Corp., Milwaukee, died June 23. Mr. Pritzlaff was superintendent of the pattern shop for 2 years and of the foundry for 15 years. He retired from active participation in 1951 and became a consultant for Falk Corp., A. O. Smith Corp. and the Waukesha Foundry Co., Waukesha, Wis.

* * *

Harry E. Lees, 62, plant divisional superintendent, Whitin Machine Works, Whitinsville, Mass., died May 30. Mr. Lees was born in England and came to America when a young man. He entered the Whitin Machine Works over 40 years ago as a wood patternmaker and was later made foreman of that department. In recent years he became plant divisional superintendent.

* * *

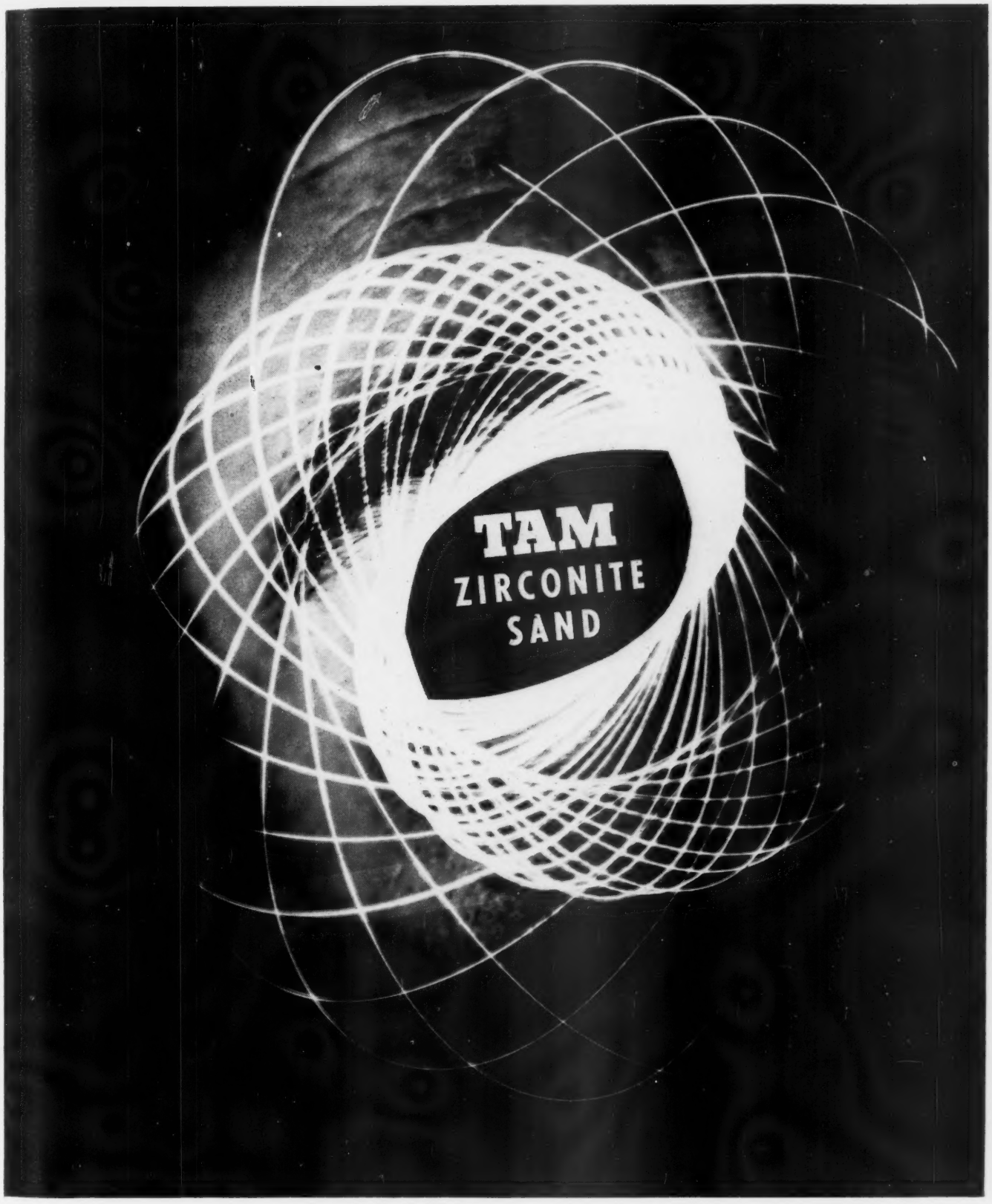
Dr. H. S. Arthur, president, Massillon Steel Casting Co., Massillon, O., died June 12.

* * *

Louis H. Knapp, 87, retired foundry superintendent, Allis-Chalmers Mfg. Co., Milwaukee, died recently.

Foundry Equipment Film

Claude B. Schneible Co., P. O. Box 502, Roosevelt Annex, Detroit 16, has prepared a sound color motion picture available on loan for use in foundry group meetings and student's classes. The film entitled "The Invisible Shield," runs 23 minutes, and shows the most modern foundry equipment from handling of raw materials in the material bay through final shipment. Operations shown include raw materials handling, cupola charging, melting, hot metal distribution, sand preparation, molding pouring, shakeout, cleaning, inspection and shipping castings. Details of dust and fume control in all of these foundry operations are illustrated.



CUTS CLEANING COSTS TO THE BONE . . . Because of its high fusion point . . . (well above 4000°F) TAM ZIRCONITE SAND ends burning-in and metal penetration of cores and molds. Easier shake-outs are promoted. These and other advantages will make it worthwhile for you to get detailed facts from our New York City office.

*TAM and ZIRCONITE are registered trademarks.

TAM PRODUCTS
Registered U. S. Pat. Off.

TITANIUM ALLOY MFG. DIVISION
NATIONAL LEAD COMPANY

Executive and Sales Offices: 111 BROADWAY, NEW YORK CITY
General Offices, Works and Research Laboratories: NIAGARA FALLS, N. Y.

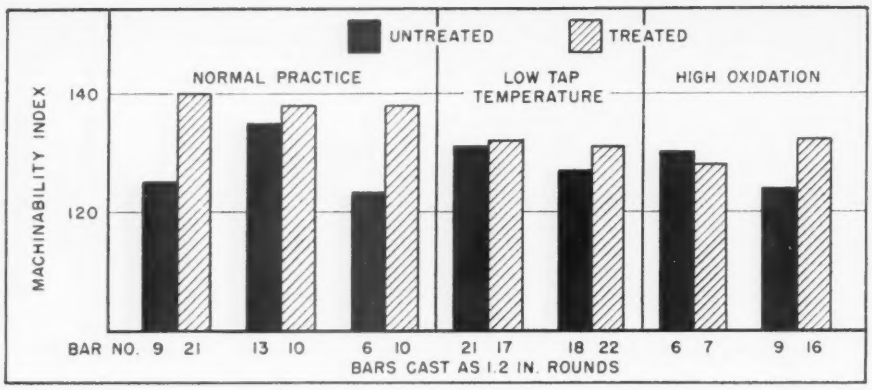


Fig. 1—Comparison of machinability ratings of silicon-carbide treated and untreated irons of like chemistry melted in 10-in. diam cupola

Machinability of Gray Iron

By Constant Pressure Lathe Tests

By EDWARD A. LORIA
Senior Engineer, Metallurgy
Research and Development Department
Carborundum Co., Niagara Falls, N. Y.

THE purpose of this article is to present quantitative data on the machinability of various gray cast irons measured on the constant pressure lathe developed by Battelle Memorial Institute.[1] This equipment consists of a lathe disconnected from the fixed feed mechanism, a means for applying a predetermined thrust force on the tool, and devices for measuring tool travel and spindle revolutions.

The equipment and testing procedure adopted in this work were described previously[2] and it will suffice to say here that the tests were standardized at 32 fpm (140 rpm) with a tool thrust of 81 lb for a ⅛-in.-deep turning cut. High-speed steel tools, with 12 degree side relief and side rake angles, were used which were ground and honed before each test. Ordinarily, the test specimens were 1.2-in.-diam. cast bars machined to 1.0-in. diam. before testing. Some tests were made on ¾-in. rounds machined from ⅞-in.-diam. cast bars.

First to be considered will be the constant pressure machinability of cast iron when melted in a 10-in.-diam. experimental cupola under normal operating conditions, under conditions producing low tapping temperatures, and under highly oxidizing conditions. Then, machinability ratings for a series of commercial irons melted in a 36-in.-diam. cupola will be tabulated and the effects of increasing carbon, carbon equivalent and transverse strength on the constant pressure index shown. Finally, ratings for another series of commercial irons melted in a 66-in.-diam. cupola will be compared and ratings for two series of high-phosphorus irons melted in 56-in.-diam. and 72-in.-diam. cupolas will be given.

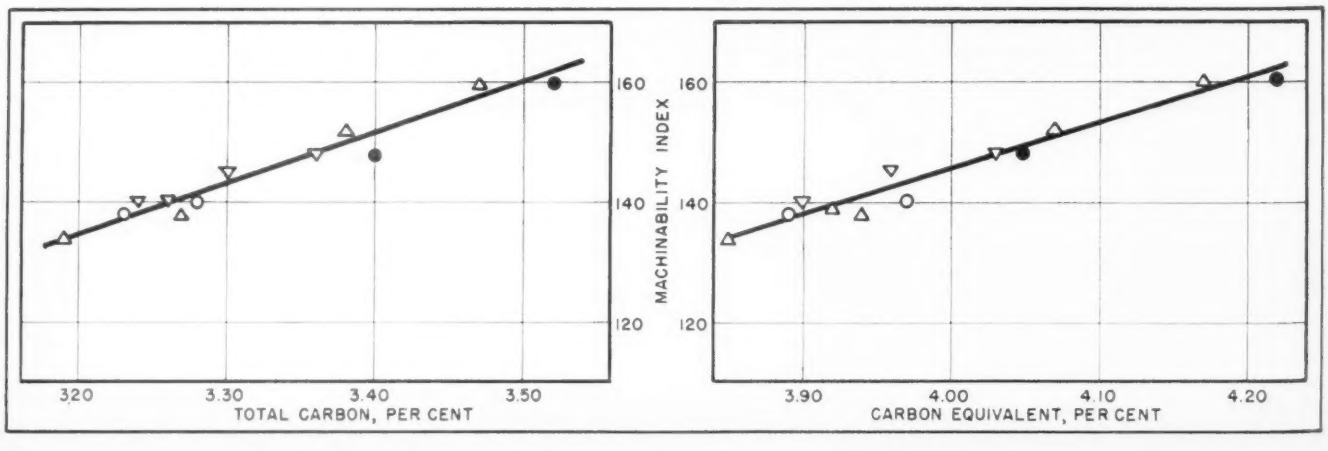
In each series, the beneficial effect of Ferrocarbo silicon carbide briquet additions to the cupola during the melting of these irons will be seen in a comparison of the individual results for irons of like chemistry and in the overall averages for a particular series of tests. Of course, strict comparisons between irons melted in different cupolas and with different charge materials, operating conditions, and chemistry cannot be justified in view of the influence of these variables on the measurements.

Experimental Irons—As part of a comprehensive investigaton of the metallurgical effects of silicon carbide briquets in cupola melted gray cast irons, a series of four pairs of heats were made in the Battelle 10-in. cupola. The first pair of heats were made under normal commercial cupola operating conditions. The nominal composition of the iron at the spout was that of a typical automotive-type iron, about 3.20 per cent total carbon and 2.10 per cent silicon. Subsequent heats were made under unusual conditions intended to produce a high degree of oxidation in the cupola and consequently variations in metal chemistry ensued.

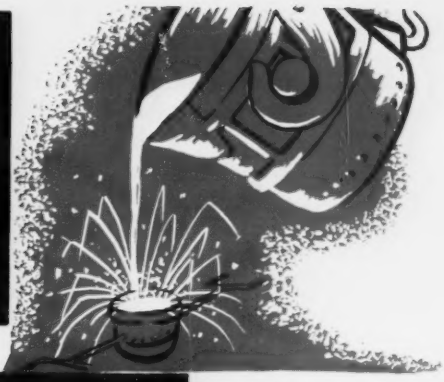
The unusual conditions included low bed heights, low tapping temperatures, lean coke ratios, low blast rates followed by high blast rates, high moisture in the blast, the use of large percentages of thin rusty scrap in the charge and the addition of iron ore in the charge. Each metal charged weighed 30 lb and varied from 30 to 50 per cent steel in different heats. The balance was malleable pig iron,

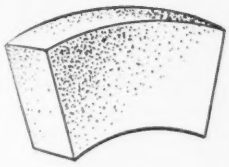
(*Continued on page* 196)

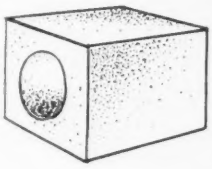
Fig. 2 (left)—Effect of total carbon on machinability of cast irons of 3.19-3.52 per cent total carbon, 2.00-2.10 per cent silicon. Bars cast as 1.2-in. rounds. Fig. 3 (right)—Effect of carbon equivalent on machinability. TC, 3.19-3.52 per cent; Si, 2.00-2.10 per cent



For Longer Lining Life Use . . .
WALSH Missouri-Quality REFRACTORIES for the FOUNDRY INDUSTRY







FIRE BRICK

Brand	Type	Fusion Point	Uses
WARCO XXT (Missouri High Heat Duty)	Deaired Stiff Mud	Cone 32-33 (3173° F.)	Metallurgical furnaces where slag and abrasive action is severe. Malleable furnace side walls.
BUNG BRICK (Missouri Super Duty)	Dry Press	Cone 34 (3200° F.)	Malleable furnace roofs.
MULLITEX (Missouri Super Duty	Dry Press	Cone 34 (3200° F.)	Furnaces operating at high temperatures with sudden temperature changes. Malleable furnace bottoms and roofs, non-ferrous furnace linings.
MULLITEX HB (Missouri High Burn Super Duty)	Dry Press	Cone 34 (3200° F.)	Highly resistant to slag and sudden temperature changes.
APEX (Missouri Extra Duty)	Deaired Stiff Mud	Cone 34-35 (3200-3245° F.)	Wherever high temperatures, slag, abrasion and corrosive action prevail.

Walsh also makes: Cupolo Blocks, Tap Out Brick, Slag Hole Block, Ladle Bottoms, High Temperature Ferrous and Non-Ferrous Furnace Linings.

PLASTICS

Brand	Max. Service Temp.	Fusion Point	Packaging	Type	Uses
GRAFLOK (Missouri Super Duty with Graphite Base) (Wet or Dry)	3000° F.	Cone 33-34	500 lb. drums 100 lb. cartons 100 lb. bags	Air & Heat Setting	For ram lining bull ladles, spouts, runners, patching, where molten metal covers and forms seal resulting in longer life, cleaner castings.
K-11 PLASTIC (Wet or Dry)	3200° F.	Cone 36-37	100 lb. cartons 225 lb. drums 500 lb. drums 100 lb. bags	Air & Heat Setting	Withstands electric furnace temperatures and conditions. Excellent for rammed linings, spouts, runners, burner ports, pit furnaces, patching.

CEMENTS

Brand	Max. Service Temp.	Fusion Point	Packaging	Type	Uses
GRAFLOK LADLE COATING (Dry) (Missouri Super Duty with Graphite Base)	3000° F.	Cone 33-34	100 lb. bags	Heat Setting	For brush coating over Graflok Plastic. Affords added protection and longer life.
MULLITEX CEMENT (Wet or Dry)	3150° F.	Cone 34-35	100 lb. bags 200 lb. drums 500 lb. drums	Heat & Air Setting	For laying up and surfacing fire brick subjected to severe joint erosion.
METALOK (Missouri Super Quality Mortar—Dry)	3200° F.	Cone 36	100 lb. bags	Heat Setting	Unusually resistant to slag action—highly suitable for laying up fire brick in malleable furnace sidewalls, ladles, hot metal mixers, electric furnaces, etc.

WALSH
REFRACTORIES CORPORATION
ST LOUIS MISSOURI U.S.A.

Walsh also supplies the foundry with Fire Clays, Ground Fire Clays, Milled Foundry Clays, Super Duty Plastic Furnace Linings, Castables and other Refractory Specialties.

101 FERRY STREET, ST. LOUIS 7, MISSOURI

FACTORIES: ST. LOUIS AND VANDALIA, MISSOURI

TABLE I—Machinability Ratings for Irons Melted in Battelle 10-in. Cupola Under Different Operating Conditions

Heat No.	Bar No.	Chemical Analysis, % TC	Si	CE	Mn	S	P	Machinability Index for Test Indicated 1	2	3	4	5	6	Average Index Not Treated	Standard Deviation Units	Variation Coefficient, %
1	6	3.24	2.12	3.95				145	132	148	92	130	89	123	23.6	19.2
	9	3.27	2.11	3.97	0.66	0.99	0.13	153	134	120	108	130	104	125	16.6	13.3
	13	3.32	1.93	3.96				159	129	136	140	129	130	135	16.3	12.1
	17	3.25	2.01	3.92	0.65	0.08	0.12	148	140	132	140	129	130	137	6.8	5.0
2	10	3.21	2.29	3.97	0.61	0.08	0.13	147	128	129	137	143	143	138	7.2	5.2
	21	3.32	2.12	4.03				146	144	127	140	130	155	140	9.5	6.8
3	17	3.21	2.06	3.90	0.55	0.09	0.13	138	122	119	131	137	145	132	9.1	6.9
	22	3.28	1.90	3.91				139	116	158	133	124	105	131	17.1	13.0
4	18	3.15	2.24	3.90	0.58	0.08	0.14	130	119	149	127	115	121	127	10.0	7.9
	21	3.27	2.06	3.96				132	120	156	124	124	125	130	12.1	9.3
5	6	3.33	1.52	3.84				136	130	134	126	124	131	130	4.2	3.3
	9	3.34	1.40	3.81	0.44	0.11	0.14	130	119	112	126	128	127	124	6.2	5.0
6	7	3.34	1.53	3.85				131	133	130	126	124	121	128	10.9	8.9
	16	3.39	1.32	3.83	0.50	0.12	0.14	138	135	94	133	135	127	132	15.9	12.1
7	7	3.09	1.96	3.74	0.54	0.09	0.13	142	127	130	119	123	138	130	8.1	6.2
	10	3.06	1.80	3.66				146	137	133	143	145	122	138	8.4	6.1
8	20	3.39	2.19	4.12	0.70	0.08	0.13	151	143	151	136	160	126	145	11.1	7.7
	21	3.21	2.20	3.94				148	140	141	128	143	135	139	6.3	4.5
	23	3.34	2.23	4.08				148	145	147	127	136	156	143	9.3	6.5

Heat No. 1-2—normal operating practice. Heat No. 3-4—low tapping temperature. Heat No. 5-6—highly oxidizing conditions—rusty steel scrap, low bed, variable blast rate. Heat No. 7-8—highly oxidizing conditions—low bed, lean coke, high blast rate. Heat No. 1, 4, 5, 7—not treated. Heat No. 2, 3, 6, 8—silicon carbide treated.

TABLE II—Machinability Ratings and Transverse Flexure Data on Irons Melted in 36-in. Cupola Under Normal Operating Practice

Heat No.	Bar No.	Chemical Analysis, % TC	Si	CE	Mn	S	Machinability Index for Test Indicated 1	2	3	4	5	6	Average Mach. Index	Transverse Test Strength, lb	Deflection, in.
2	5	3.16	1.98	3.82	0.50	0.13	145	137	133	102	126	121	127	2415	0.219
	6	3.24	1.99	3.90	0.52	0.17	139	161	133	130	144	130	140	2105	0.216
	7	3.36	2.00	4.03	0.54	0.12	134	166	143	153	152	138	148	2340	0.306
	8	3.30	1.99	3.96	0.51	0.14	140	164	133	148	148	136	145	2250	0.265
3	10	3.38	2.18	4.10	0.49	0.15	153	171	154	166	169	157	162	2150	0.348
	11	3.29	1.87	3.91	0.49	0.16	137	163	173	150	139	144	151	2425	0.255
4	13	3.47	2.09	4.17	0.47	0.12	145	174	178	157	154	153	160	2175	0.306
	14	3.38	2.07	4.07	0.51	0.13	137	169	172	143	146	143	152	2195	0.269
5	15	3.70	2.05	4.38	0.42	0.12	154	193	183	152	148	146	163	1970	0.292
	16	3.25	2.01	3.92	0.46	0.13	123	138	135	156	124	155	139	2390	0.321
	17	3.19	2.00	3.85			116	141	118	143	129	154	134	2550	0.286
	18	3.27	2.01	3.94	0.45	0.13	110	145	125	153	146	148	138	2395	0.269
6	19	3.52	2.10	4.22			123	160	148	174	185	169	160	1890	0.295
	20	3.23	2.31	4.00	0.53	0.11	120	150	129	170	165	154	150	2185	0.293
	21	3.40	2.00	4.05			121	143	136	160	173	154	148	2290	0.311
	22	3.20	2.47	4.02	0.55	0.11	127	143	151	173	136	154	147	2135	0.304
7	23	3.23	2.00	3.89			120	137	145	153	125	148	138	2455	0.306
	24	3.28	2.06	3.97	0.50	0.11	120	140	147	155	126	149	140	2385	0.302
	25	3.38	2.11	4.08	0.46	0.11	125	144	129	159	137	147	140	2390	0.276
	26	3.26	1.89	3.89	0.52	0.13	122	139	119	145	130	153	135	2460	0.289

Heat No. 4-5—special briquette A (ZrC-SiC). Heat No. 2-3—special briquette B (ZrC-SiC). Heat No. 6—ferrosilicon briquette. Heat No. 7—ferrocarbo briquette (SiC).

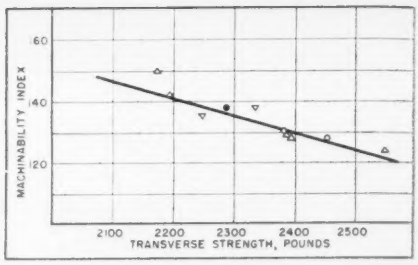


Fig. 4—Effect of transverse strength on machinability index of cast irons of 3.19-3.47 per cent TC, 2.00-2.09 per cent Si. Bars 1.2-in. rounds

(*Continued from page* 194)

and enough silvery pig iron was added to adjust the silicon content of the charge. In some heats, the silicon carbide briquets were used as 1-in. lumps to make up an addition of 1 per cent of the weight of the other components of the metal charge. Iron was tapped intermittently in 30 lb increments, the normal melting rate of the cupola being 600 lb per hour. Four standard ASTM 1.2-in.-diameter test bars for machining tests were poured from each tap, the bars were molded individually in cores and were poured vertically

To evaluate the effects of silicon carbide on the machinability of gray iron made under these conditions, representative samples were selected from 14 different taps from heats 1 to 6. The bars were selected so that the effect could be evaluated on irons of the same or of different chemical compositions, or on irons having the same or different chill depths. The selected irons, and the results of the machinability tests, are described in Table I. The silicon-carbide treated irons have an average index of 136, compared with 130 for the untreated iron. This indicates an average improvement in machinability of about 5 per cent. A statistical analysis of

(*Continued on page* 198)

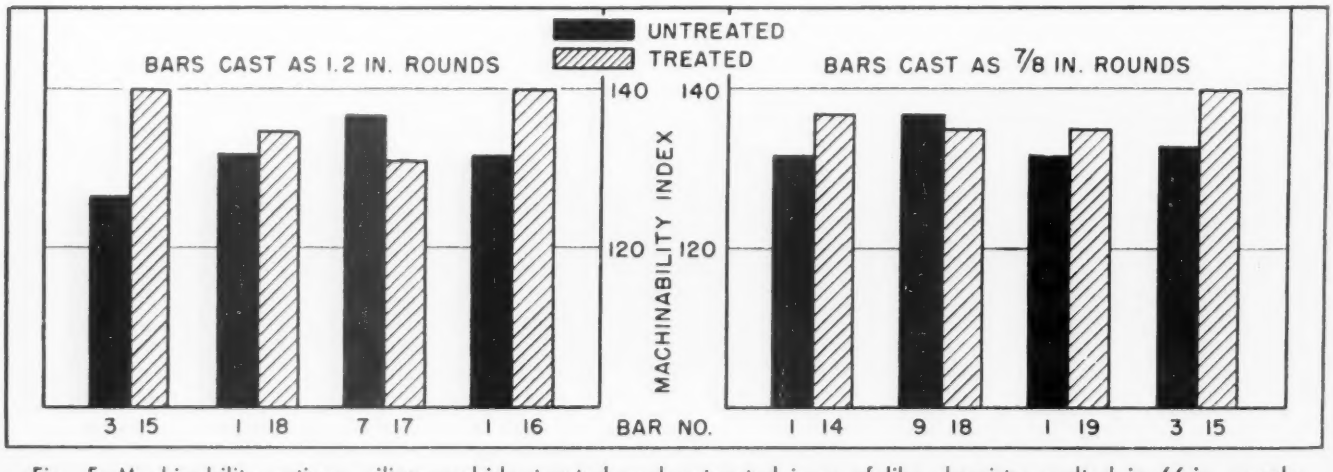


Fig. 5—Machinability ratings, silicon-carbide treated and untreated irons of like chemistry melted in 66-in. cupola

Accurate

SINGLE GANG SPLIT CORE BOX

ASSURES ACCURACY WITHOUT MACHINING

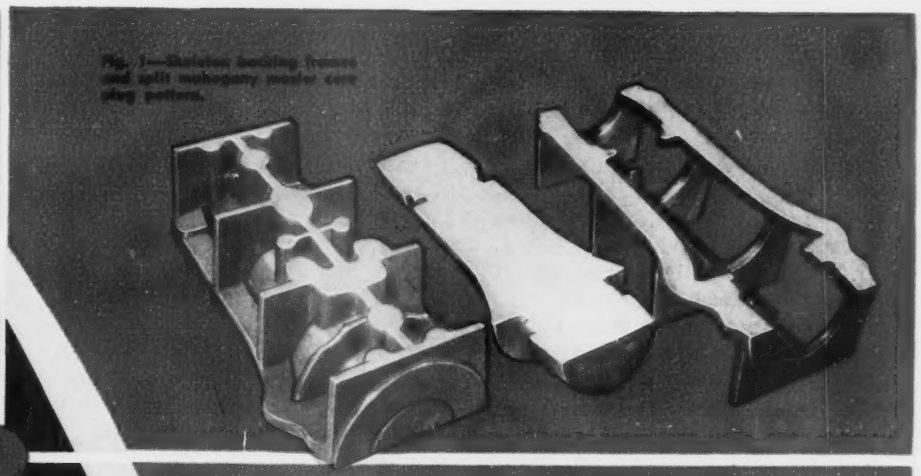


Fig. 1—Skeleton backing frames and split mahogany master core plug pattern.

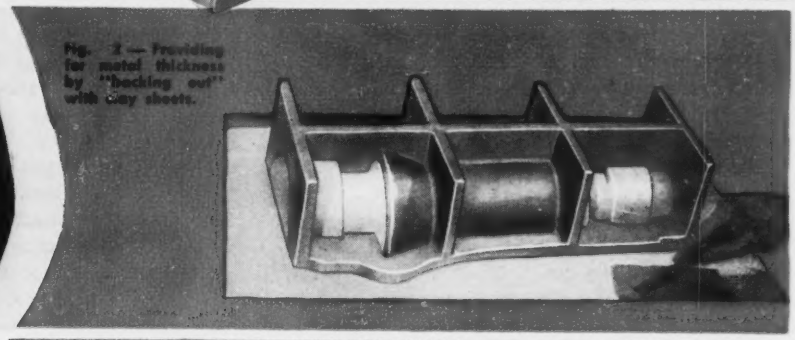


Fig. 2 — Providing for metal thickness by "backing out" with clay sheets.

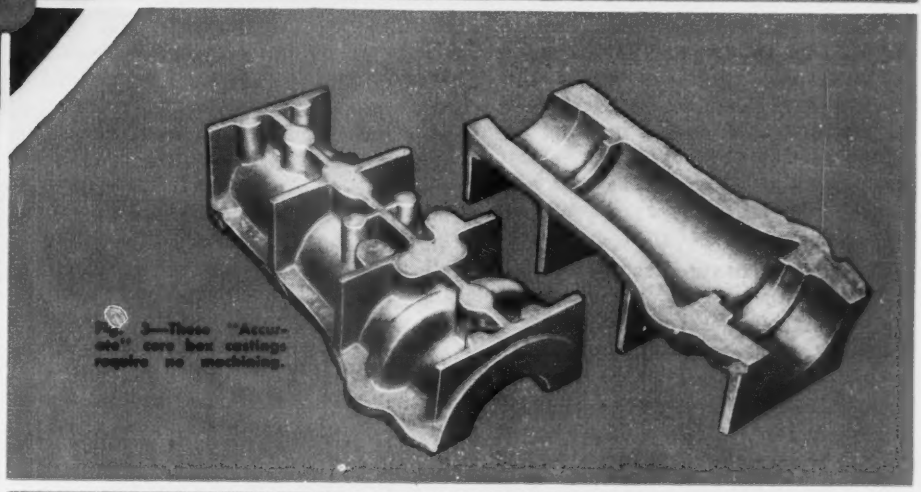


Fig. 3—These "Accurate" core box castings require no machining.

QUICK DELIVERY

By Air Freight, Parcel Post, Special Delivery or Railway Express. Pick-up and delivery by jobber representatives in the following areas:

- **AUBURN, MASS.**
  Henry A. Kottman
  Telephone: Auburn 2683
- **MILWAUKEE, WIS.**
  John M. Donohue
  Telephone: Hilltop 2-7130
- **NORMAL, ILL.**
  Clarence C. Schmidlin
  Telephone Normal 8551-5
- **LOS ANGELES, CALIF.**
  McGowan Company, Inc.
  Telephone: Trinity 2057

Split master core plug pattern and skeleton frames are all that is necessary—for plaster molds used as a casting medium assure smooth, accurate castings. Large or small, single or multigang, you can substantially reduce your core box costs by using this modern method.

Write for new illustrated book.

Accurate

MATCH PLATE COMPANY

1847 West Carroll Avenue
Chicago 12, Ill.
Telephone SE eley 3-7918

(*Continued from page* 196)

the average results indicated the probability was better than 0.95 that the improvement was significant and not due to experimental error.

The bar graphs shown as Fig. 1 present a comparison of the machinability ratings for irons of like chemistry (see Table I for chemistry), with and without silicon carbide addition. Indeed, the most valid comparison that can be made is one between irons of like chemistry and section size, provided they were melted in the same cupola from analogous raw materials and operating conditions. The beneficial effect of silicon carbide as a graphitizing inoculant is apparent in practically all of the pairings regardless of the melting practice or changes in metal chemistry.

Effects of Carbon and Silicon — Arbitration (1.2-in. diam) bars were cast in green sand in regular sequence from a series of commercial heats made in a 36-in.-diam cupola under normal operating conditions. The 600-lb metal charges were 25 per cent pig iron, 27 per cent steel, 48 per cent returns and supplemental additions of 1 per cent silicon carbide or ferrosilicon briquet were made to arrive at the desired nominal analysis of 3.35 per cent total carbon, 2.00 per cent silicon. The iron was tapped intermittently at the rate of 4 tons per hour.

Transverse flexure tests were first made on these bars and then the broken halves were subjected to the constant pressure machinability procedure. The results for these bars together with their respective chemical analyses can be found in Table II. It can be seen that data are presented for irons of a wide analysis range and, as generally expected, the machinability rating increased and the transverse strength decreased as the total carbon or carbon equivalent of the iron increased. An accurate trend line showing the beneficial effect of total carbon and carbon equivalent (total carbon plus 1/3 silicon) on constant pressure machinability can be drawn by appropriate selection of these data. This has been done in Figs. 2 and 3, employing the values obtained for irons of 3.19 to 3.52 per cent total carbon with silicon ranging only from 2.00 to 2.10 per cent. Employing a greater silicon content range would produce a wider scatter band of results and obscure the true incremental effect of carbon.

The relationship between machinability index and transverse strength for these same irons is presented in Fig. 4. Good correlations were obtained by this selection of the data. The trend lines apply strictly to this particular series of irons but the same effect would, no doubt, be obtained generally. In passing, the effect of the various briquet additions to the same metal charge can be noted by any comparisons between irons of similar chemistry.

Bar graph comparisons are made in Fig. 5 for a series of commercial irons melted in a normally operated 66-in.-diam cupola utilizing 2500-lb charges of 28 per cent pig iron, 18 per cent steel, 46 per cent returns and supplementary additions of silvery pig, ferrosilicon or 1 per cent silicon carbide briquettes. The melting rate was 15 tons per hour with continuous tapping and the desired nominal analysis was 3.35 per cent total carbon, 2.20 per cent silicon. Actual analyses of the bars plotted are shown in Table III. Both 1.2 in. and 0.875 in. diam bars were cast in core, and machining tests were made on those selected on the basis of comparable chemistry. The complete data were presented in Tables II-IV of the preceding article.[2] Included here are the results for untreated and silicon-carbide treated irons of like chemistry. Again the higher machinability indices obtained for the latter are quite evident.

High-Phosphorous Irons—It is well known that the amount of phosphorus in gray iron has pronounced effects on the machinability of the finished casting. This is particularly true whenever high-phosphorus castings are machined at high cutting speeds. Here the hard abrasive phosphide causes a severe reduction in tool life, and such conditions as segregation and nonuniformity of structure give rise to relatively poor machining qualities. The poor machinability rating of high-phosphorus gray iron has hindered to a great extent the universal acceptance by the automotive industry and other large volume consumers of castings produced wholly from southern pig iron.

To investigate what the machinability measurements for such irons would be on the constant pressure lathe, two series of 1.2 in. and 0.875 in. diam. bars were selected for testing. The first series of irons were melted in a 56-in.-diam cupola producing 10 tons per hour by continuous tapping. Each 1700-lb charge consisted of 40 per cent pig iron, 30 per cent returns, 30 per cent purchased scrap, with supplementary additions of 1 per cent silicon carbide or ferrosilicon to achieve a nominal analysis of 3.60 per cent total carbon and 2.20 per cent silicon.

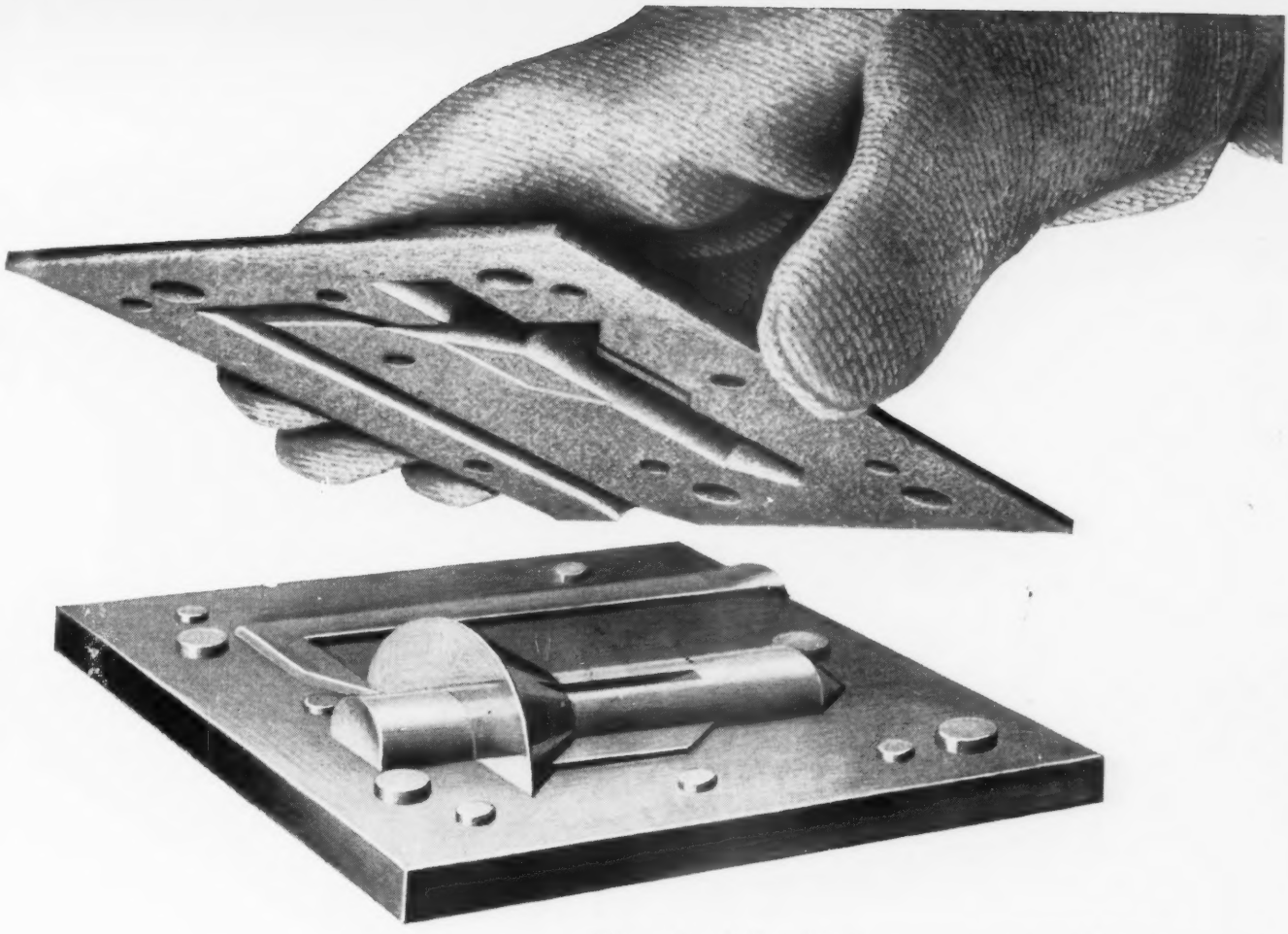
The second series represents metal from a 72-in. diam cupola producing 17 tons per hour with continuous tapping. Each 4000-lb charge contained 48 per cent pig iron, 35 per cent returns, 12 per cent purchased

(*Concluded on page* 200)

TABLE III—Machinability Ratings on High-Phosphorus Irons Melted in 56-in. and 72-in. Cupolas Under Normal Operating Practice

Bar No.	Chemical Analysis, % TC	Si	CE	Mn	S	P	"R" Value For Test Indicated 1	2	3	4	5	6	Machinability Index for Test Indicated 1	2	3	4	5	6	Average Machinability Index	Coefficient of Variation %
1	3.55	2.12	4.37	0.55	0.09	0.63	16.9	17.7	18.4	17.8	18.1		166	164	154	152	160		159	3.4
2	3.51	2.18	4.35	0.54	0.11	0.61	18.7	19.3	19.8	18.0	18.2	17.9	150	150	143	151	159	166	153	4.8
3	3.52	2.11	4.35	0.50	0.11	0.65	17.6	18.7	18.5	18.0	17.4	18.5	159	155	153	150	166	161	157	3.4
4	3.46	2.06	4.26	0.51	0.13	0.60	19.1	19.6	19.8	19.4	18.7	19.0	146	148	143	140	154	156	148	3.8
5	3.55	2.14	4.37	0.51	0.11	0.60	17.1	18.2	18.4	17.4	17.1	17.1	164	159	154	156	169	174	163	4.4
B1112 (Standard)			First Cut				27.2	27.8	26.2	25.5	27.8	29.6								
			Last Cut				28.8	30.1	30.3	28.6	30.0	29.8								
			Average				28.0	29.0	28.3	27.1	28.9	29.7								
6	3.44	1.96	4.15	0.48	0.08	0.41	26.8	29.9	21.8	26.0	23.7		105	97	139	113	120		115	12.5
10	3.46	1.92	4.16	0.47	0.11	0.41	23.3	21.8	25.8	27.1	20.7		121	133	117	108	138		123	8.9
8	3.47	2.06	4.21	0.47	0.08	0.41	22.7	23.9	24.8	21.3	28.4		124	121	122	138	140		129	7.8
12	3.42	2.01	4.16	0.46	0.10	0.44	20.4	26.0	21.9	23.4	25.6		138	111	138	125	111		125	9.7
B1112 (Standard)			First Cut				25.8	27.3	29.7	29.5	26.5									
			Last Cut				30.6	30.5	30.6	29.1	30.5									
			Average				28.2	28.9	30.2	29.3	28.5									

Bar No. 1, 4, 5, 6, 8—silicon carbide treated. Bar No. 2, 3, 10, 12—untreated. First series cast as 1.2-in. rounds, second series cast as 0.875-in. rounds. CE = TC + 0.3(Si + P).



HERE'S A "SHELL GAME" where EVERYBODY wins...

When *this* shell is lifted, everyone concerned benefits—you, your employees and your customers—thanks to the tremendous advantages offered by the revolutionary new shell-molding process!

The new shell process, which requires as little as 5% of the sand handled in conventional green sand molding, yields more castings per ton of metal . . . makes possible close tolerances that completely eliminate costly machining in many cases . . . offers other important advantages that add up to big savings for you in time, money and materials.

General Electric's new phenolic shell resin is specially designed to help you get the maximum benefits that this process offers. It forms strong, dimensionally accurate shells that produce clean castings with close tolerances.

For more information about shell molding and G.E.'s new shell resin, just mail the coupon.

SEND COUPON TODAY FOR MORE DETAILS

General Electric Company
Section 126-3A, Chemical Division
Pittsfield, Massachusetts

Please send me a free copy of "G-E Phenolic Resins for Shell Molding Process." Include information on:

- ☐ G-E Phenolic Resin Core Binder 12353
- ☐ G-E Permafil 3255 for impregnating porous castings

Name_____

Firm_____

Street_____

City_____ Zone_____ State_____

You can put your confidence in—

GENERAL ELECTRIC

126-3

(*Concluded from page* 198)

scrap, 5 per cent steel and supplementary additions of 1 per cent silicon carbide or ferrosilicon briquets to arrive at a nominal analysis of 3.50 per cent total carbon, 1.95 per cent silicon.

The constant pressure machinability data for these irons can be found in Table III. The test data for the first showed excellent reproducibility as indicated by the low coefficients of variation. The average index of the series (156) is higher than most groups of samples studied previously. This would be expected in view of the higher total carbon and carbon equivalent values which counteracted any detrimental effects from the higher phosphorus content.

The data show that machinability is not hindered by the 0.60-0.65 per cent phosphorus in this series of relatively soft irons. The machinability indices of these samples vary rather uniformly with the total carbon content and seem to fall on about the same trend line for other data on commercial samples having lower total carbon contents (Fig. 2). They do represent a rather narrow analysis range, and the beneficial effect of silicon carbide addition in the cupola charge is reflected in the higher ratings obtained for the treated irons. The test data for the second series of lower carbon equivalent irons show more scatter in results for some of the bars. The data indicate that more variation in cutting rate occurred in respect to the order of testing than between samples. The first sample tested on each tool always had the highest index, while the last sample had the lowest index.

These samples appeared to be very sensitive to the condition of the tool. Perhaps the testing difficulties resulted from the smaller test bar diameter (hence a faster cooling rate producing a less machinable microstructure) and the fact that less metal was removed from the surface before testing. Generally, this series had lower ratings than other cast irons of comparable total carbon or carbon equivalent but lower phosphorus content. Again, the silicon-carbide treated irons had the higher ratings.

References

1. F. W. Boulger, "Machinability Measurements on Constant Pressure Lathes," *The Tool Engineer*, Vol. 26, July, 1951, p. 25-30.
2. E. A. Loria, "New Test Methods for Machinability of Gray Cast Iron," FOUNDRY, March, 1952.

OUT OF THIS WORLD FOR WEAR!

PARACOAT Pattern Finish

LASTS LONGER...DRAWS CLEANER...SAVES TIME

- Maintains its hard, smooth, tough, wear-resistant surface under all foundry conditions. Patterns draw clean with no damage to molds.
- Resists sand wear because of its rubber content. Users report 10 to 50 times the life of shellac and other finishes.
- Does not become sticky or tacky even when hot damp molding sand is rammed around Paracoated patterns.
- Finger dries in about 15 minutes —2 coats in 30 minutes.
- Requires no change in regular practice. Easily applied by brush, spraygun, or dipping.
- Can be applied to new, old, or repaired wood patterns. Does not raise the grain.
- Eliminates warping of patterns by preventing absorption or loss of moisture.
- Allows patterns to be stored in open sheds without danger of mildew, mold, or warping.

WHAT PARACOAT IS

Paracoat is a unique pattern coating containing rubber and other special modern chemicals carefully compounded in fast-drying solvent known as Parasolv. Represents many years of practical experience, research, and effort to build the ideal pattern coating.

WHAT PARACOAT DOES

Paracoat gives an ideal protective coating to wood, plaster, and metal patterns and core boxes. Because of its unusual characteristics, it is used for many other purposes in pattern, model, and woodworking shops. Taking the place of ordinary varnishes, lacquers and paints, it gives added protection from moisture, acids, alkalis, corrosive gases, etc.

WHY THOUSANDS USE IT

Paracoat gives better results at less cost. Thousands of wood and metal shops here and abroad increase their profits with Paracoat.

WRITE DEPT. F6 FOR LITERATURE

Also ask about **PARASPRAY**, the modern core and mold surface conditioner, and **BONISPRAY**, the permanent mold and die dressing.

Para Products Have A Place in Every Foundry

PARASPRAY PARACOAT BONISPRAY

FOUNDRY RUBBER INCORPORATED

4914 Bethesda Ave., Bethesda, Maryland
Phone: OLiver 1022

Book Review

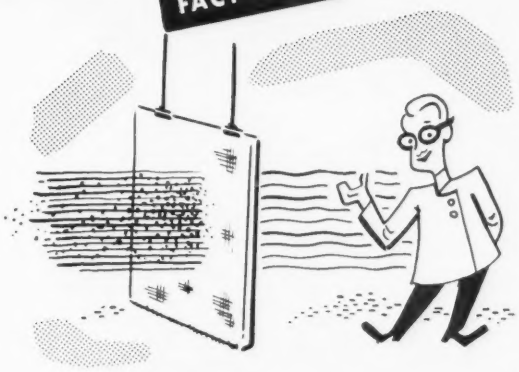
Planning and Developing the Company Organization Structure, by Ernest Dale, cloth, 232 pages, 6 x 9 in., published by American Management Association, New York. Price $4.50.

The development and change of individual company organization structure is analyzed in this book, which attempts to combine the systematic thinking on this subject with the rule of thumb of practical experience. Thus it integrates the formal structure of the enterprise with the human forces that mold and are molded by it.

Contents of the book constitute a research report following a two-year investigation by the author of company organization problems. Main body of the report is divided into two parts: One deals with the dynamics of organization. This is an analysis of the major organizational problems as they arise at various stages of a company's growth. The second part deals with the mechanics of organization. It offers suggestions for analyzing existing structure and modifying or changing it, in accordance with the best established practices, to conform to the needs of the individual company.

GET THE FACTS ON DUST CONTROL!

FACT NO. 1



CLOTH FILTRATION is the oldest, most reliable and most efficient technique for separating dust and fumes from air or gases.

FACT NO. 2

BAG CONSTRUCTION of filter produces longer cloth life and easier inspection and replacement of filter while working on clean air side.

FACT NO. 3

BAG SHAKING ACTION is the most efficient method of cleaning the filter and does not reduce the collection efficiency.

FACT NO. 4

OVER-ALL EFFICIENCY of any dust control equipment is completely dependent upon the excellence of the engineering that goes into it.

If you have a dust problem in your plant, these facts are important to you. They mean that unless dust control equipment is designed on the basis of these fundamentals it can not achieve the high operational economy and efficiency desired by every manufacturer.

Dracco Dust Control Equipment has *always* been designed to incorporate cloth filter bags and effective cleaning action. High over-all efficiency is assured by Dracco's engineering experience, the result of 35 years devoted exclusively to this field.

When you have a dust control problem, rely on Dracco for a profitable solution based on facts.

DRACCO CORPORATION

Harvard Ave. and E. 116 St. • Cleveland 5, Ohio

For specific information on Dracco "Performance Proved" Equipment, contact your nearest Dracco Representative or Dept. G-8, Cleveland 5, Ohio.

DRACCO

Performance Proved

Airstream CONVEYORS • DUST CONTROL EQUIPMENT

Where steelmakers have the need, MAKERS OF ALLOYS VANCORAM CHEMICALS AND METALS *VCA shows the way.*

VANADIUM CORPORATION OF AMERICA

420 Lexington Avenue, New York 17, N. Y.
Pittsburgh • Detroit • Chicago • Cleveland

RESEARCH LABORATORY—Bridgeville, Pa.
PLANTS—Niagara Falls, N. Y., Graham, W. Va., Bridgeville, Pa.
MILLS—Durango and Naturita, Colo., White Canyon, Utah.

Here's an added source of Vancoram Alloys for the Iron, Steel, Aluminum and Chemical Industries . . .

First unit of NEW *plant of* VANADIUM CORPORATION *now in operation at Graham, W. Va.*

This plant is the largest single expansion in our corporation's history. Here we are producing a number of varieties of our Vancoram alloys for use by the iron, steel, aluminum and chemical industries.

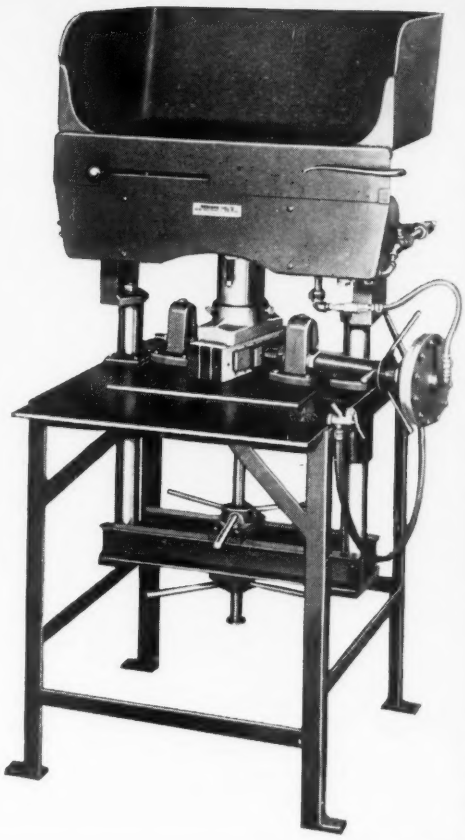
Part of a consistent program of expansion, this addition is designed to keep the corporation a step ahead of the ever-growing demands of industry.

WHAT THIS PLANT MEANS TO YOU:

- Better all-round service . . . our new location is situated close to power sources, raw material supply and transportation.
- Quick deliveries . . . since output is increased.
- Easy inventory control . . . you order just the amount you need, when you need it.
- Improved production planning . . . you can count on a full supply of ferro-alloys.

Redford CORE BLOWERS

Assure MAXIMUM Production With MINIMUM Effort



THE NO. 2 STATIONARY MAGAZINE TYPE

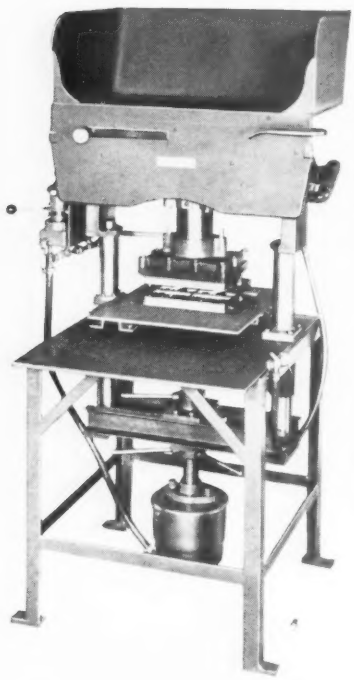
8 OUTSTANDING FEATURES:

1. Large stationary work area.
2. Large sand supply hopper.
3. Stationary sand magazine.
4. Easy accurate locating of core boxes.
5. Quick change magazine heads.
6. Quick adjustment for different height core boxes.
7. Quick change, fully adjustable, vertical clamping attachment.
8. Actuating one handle clamps the core box, blows the core and releases the core box, in two seconds.

CAPACITY: Cores up to 5#

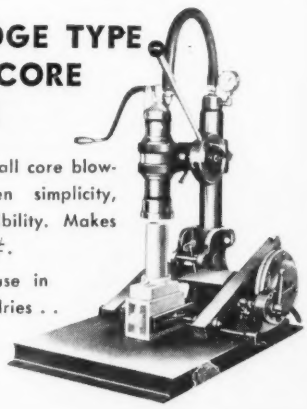
Write for Specification Bulletin "F"

THE No. 2-D CORE BLOWER



A fast and accurate DRAW TYPE core blower for small work—has stationary sand magazine and many additional features assuring maximum production. Quickly adjusted to accommodate core boxes not requiring the draw feature. Can be equipped with clamping attachment for vertically split core boxes.

THE CARTRIDGE TYPE BENCH CORE BLOWER



The original small core blower . . Proven simplicity, speed and flexibility. Makes cores up to 2#.

Thousands in use in American Foundries . .

Write for Specification Bulletin "G"

SIX FEATURES:

1. MAXIMUM SAFETY—Operator must use both hands at once to clamp core box and blow cores.
2. ACCURATE DRAW—Stationary sand magazine and long lead on draw table shaft assure accurate draw.
3. ADJUSTABLE LENGTH OF DRAW—Quickly changed without changing height of table.
4. FLEXIBILITY—Easy adjustments permit use of draw feature even on short run jobs. Draw type magazine heads having removable blow plates are interchangeable with regular No. 2 magazine heads.
5. CORE BOX VIBRATION—Controlled by keeping draw valve handle depressed during draw operation.
6. PROVEN—The No. 2-D is being used in leading foundries everywhere. Backed by the Redford reputation for quality equipment.

Write for Specification Bulletin "D"

Redford IRON & EQUIPMENT CO.

20733 GLENDALE AVENUE • Phone KEnwood 1-8611 • DETROIT 23, MICHIGAN

Preventing Shrinkage In Cut Gear Teeth

ABC of Foundry Practice

By PAT DWYER, *Engineering Editor, FOUNDRY*

THE problem of how to prevent shrinkage or porosity in the roots of cut gear teeth and in the groove bottom machined in pulley faces has plagued foundrymen for many years. Sometimes the defect is cured by a change in the metal mixture, sometimes by a change in the gating system, sometimes by mold manipulation, and sometimes by a combination of two or three of the foregoing factors.

In a recent typical instance a foundryman wrote that this form of defect appears when the teeth are cut in a gear segment casting weighing approximately 200 lb, dimensions as shown in the accompanying illustration. His only available metal is malleable pig iron—Si 1.70, S 0.034, P 0.106, Mn 1.24—and machinery scrap. The 1000-lb cupola charge is a 50-50 mixture of pig iron and scrap with three silicon briquets to give estimated silicon in casting 1.94 per cent. In a cope flask 8 in. deep he placed three 3-in.-diam. risers on top. He also tried them on the side. He tried pouring the metal hot, also cold. In one instance he placed chills against the face. The resulting face was too hard to machine.

Malleable pig iron is excellent material for smooth, hard wearing and long-life cut gears. However, like all strong, hard metal, it freezes much more quickly than plain, ordinary iron. As every foundryman is aware, castings freeze from the outside to the inside. The metal in the thick part of the casting freezes gradually towards the center and keeps feeding from the center which is still liquid. Finally, no metal is available for feeding, with the result that the metal in the center section is not solid. For many castings this is not an important factor. It is of prime importance in a cut gear casting. The metal must be clean and solid all the way through.

In some instances instead of a definite shrink, the iron has a coarse structure. The composition is not suitable for the section thickness. For example, a high-silicon iron suitable for a thin section will show a coarse open structure in a heavy section, due to slow cooling. In a case of that kind it is advisable to change the mixture to obtain a lower silicon content by increasing the amount of scrap or by adding some steel scrap to the cupola charge.

Since the firm in the present instance doubtless considers itself lucky in having a supply of malleable iron, the foundryman has no alternative but to use it. However, he might change the proportion to some extent. Instead of a 50-50 combination he might try 40 per cent pig iron and 60 per cent good machinery scrap.

For lack of detail on the point, it is assumed that the metal is poured through a single sprue and two or three gates are located in the inside or small arc of the circle. The assumption is based on a knowledge of rather common foundry practice. In fact, it is the only place to gate a casting in a tight-fitting flask. It is not the best place. The metal has to flow over a comparatively wide green sand area where it loses a certain amount of temperature before it enters and fills the blank gear section at the end of the journey. Every effort should be directed to filling this part of the mold with maximum temperature metal.

A proper gating system would include a 2-in. sprue at one end connected to the mold cavity with a single gate 1x2 in. at the joint and cut into the gear section of the mold. The metal should be poured fast and hot. With this combination the metal will solidify at a somewhat slower speed and thus eliminate any porosity or shrinkage at the root of the cut teeth. As a further precaution the size of the three risers might be increased to 4 in. constricted to a neck 2 in. diam., about ½-in. above the junction of riser and casting. This neck may be formed in green sand, but it is better in a thin dry sand core, either rammed up with the cope or placed in a print after the cope is lifted and held in place by a wire extending through the cope, or by a few wire nails at the outer edge.

The third preventive of casting shrinkage or porosity referred to in the first paragraph is the best. A core print is attached to the outside of the deep part of the pattern. A small corebox is constructed with the desired number of teeth—that is, a multiple of the total desired number. The sand teeth are smaller by approximately ¼-in. than the anticipated metal teeth shown on the shop drawing. The mold is made in the usual manner and gated as described some time back. The core segments are dropped into place and the mold is closed. Obviously with the core teeth projecting into the mold cavity, the metal thickness will be reduced and will be fairly uniform. There will be no evidence of hot spots or porous areas when the operator of the gear cutting machine sinks a cutter into the various cavities. Incidentally, he does not have to remove so much metal.

Alternatively (1) gaps for the

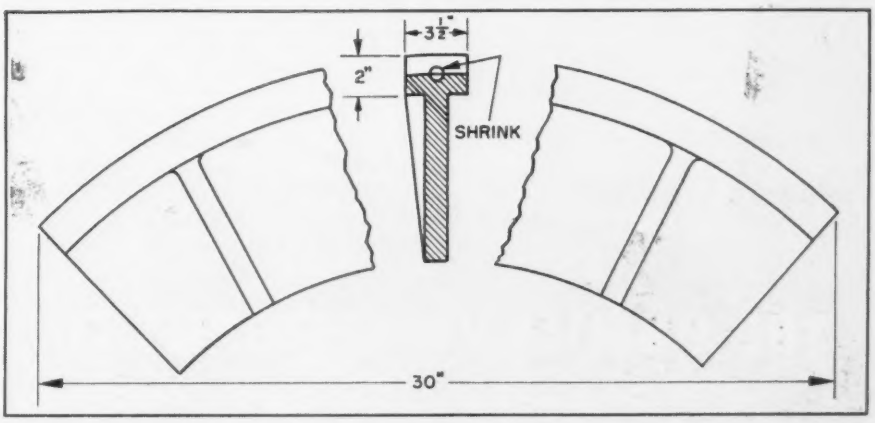


Fig. 1—Shrinkage areas appear when teeth are cut in face of gear segment

THE
Buy-Law
FOR REFRACTORY PERFORMANCE

High Softening Point
High Heat Resistance
High Anti-Spalling
High Melting Point
High Volume Stability
High Anti-Slagging

Mullite is the only alumina-silica refractory stable at high temperatures . . . and for mullite the buy-law is SHAMVA®

THE MULLITE REFRACTORIES CO.
SHELTON, CONN.

rough teeth may be cut in the existing pattern, or (2) a narrow segment with three or four teeth, Fig. 3, may be dropped into a mold from the present pattern. The teeth can be rammed in place as the segment is moved around from one end to the other end of the mold.

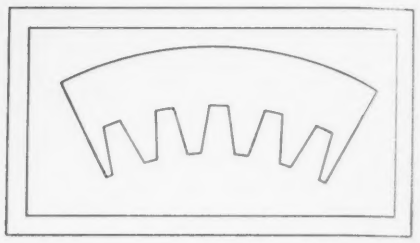


Fig. 2—A corebox, open at the top and bottom, produces cores for roughing out the teeth in a cut gear

For a grooved pulley the procedure is somewhat different. The inside of the mold is formed in green sand with the hub and arms in dry sand cores. The outside is formed in a number of segment cores with the necessary grooves formed in the concave face. The grooves in the cast-

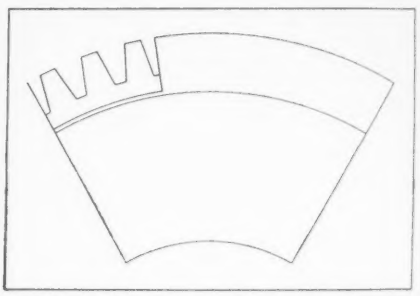


Fig. 3—Small wood tooth block is employed to form green sand teeth

ing are machined later to accurate dimensions. Top and bottom cores in the assembly are provided with flanges which embrace the green sand and hold the cores in correct position while sand is rammed around them in a flask or pit.

Plans Time Study Clinic

Industrial Management Society, 35 East Wacker Drive, Chicago 1, has announced its 16th annual time and motion study and management clinic to be held Nov. 5-6-7 at the Sheraton Hotel, Chicago. Annual methods improvement competition, inaugurated last year to stimulate advances in industrial engineering techniques will be again featured. Latest developments in fields of time and motion study, job evaluation, methods, plant layout, etc. will be discussed.

ONE-MAN HANDLING

for loads up to 15 tons

Here's the low-cost way to lift, transport, lower and stack heavy materials *anywhere* within an entire bay! One man with a push-button does the entire job with a P&H Trav-Lift without rehandling!

The Trav-Lift is custom built to your requirements. With variable speed full magnetic control, you may have five distinct steps for all motions to meet every need for speed or precision handling.

A number of standard designs enable us to meet your needs at far lower cost when service requirements do not warrant investment in a heavy-duty crane. The Trav-Lift is a product of P&H — America's leading builder of overhead handling equipment.

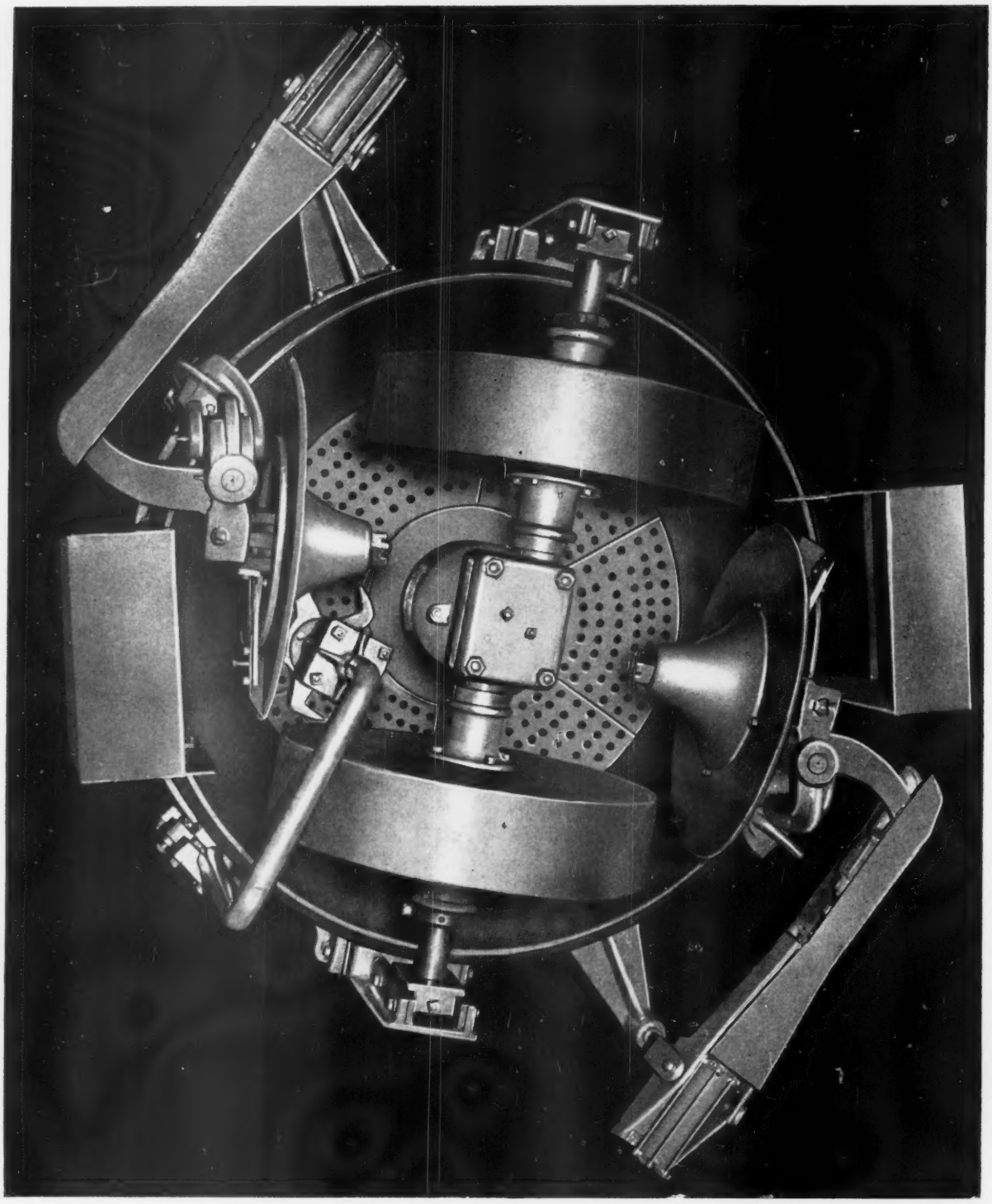
Handle it "thru-the-air" at lower cost.

P&H OVERHEAD CRANE DIVISION

HARNISCHFEGER CORPORATION

4405 West National Avenue • Milwaukee 46, Wisconsin

Power Shovels • Crawler and Truck Cranes • Overhead Cranes
Hoists • Arc Welders and Electrodes • Soil Stabilizers
Diesel Engines • Pre-Fabricated Homes



Double discharge points on opposite sides of Mixer furnished on special order only. Standard model has one discharge point.

you always get properly prepared sand with a . . .

Clearfield Mixer

Proper preparation of sand for good foundry results is a matter of precision—and can be consistently accomplished only by equipment engineered, designed, and built to encompass all the many factors involved. And that's a perfect description of Clearfield Mixers. There's a Clearfield Mixer to meet any sand preparation need. Write today for catalog No. 79 for complete details.

CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U.S.A.

Giant Betatrons Used to Inspect

TANK ARMOR CASTINGS

THREE 24,000,000-volt betatrons, the first ever built for industrial operation, are now being used in eastern and midwestern steel foundries to help speed production of vital armor steel castings, required in the Army's tank program.

Powerful enough to penetrate 7 to 9 inches of armor steel in little more than a minute, the new X-ray giants greatly speed and improve inspection techniques formerly requiring hours and days in some cases.

The units are being operated for the Army in armor-producing plants of General Steel Castings Corp., at Granite City, Ill, and Eddystone, Pa., and by Continental Foundry & Machine Co, at East Chicago, Ind. Both companies currently are producers of heavy armor parts for tanks. A fourth installation is under way at the Continental plant in Coraopolis, Pa.

Housed in specially designed radiation-proof buildings, each of the units is estimated to have cost approximately $225,000. All have been built for the Army Ordnance Corps under supervision of the U. S. Army Corps of Engineers.

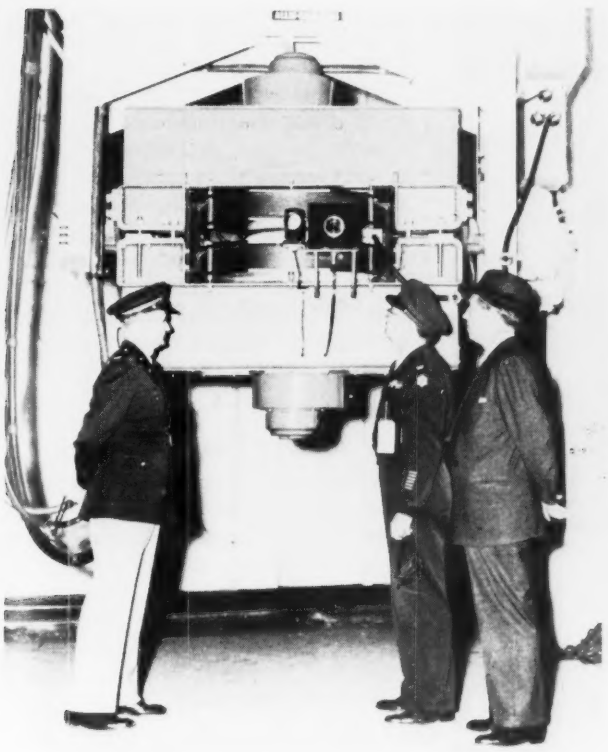
Previously used only in physics laboratories in atom-smashing experiments, for medical research, and in cosmic ray studies, the betatron now is recognized as the most advanced scientific tool for nondestructive testing of heavy steel castings. Applied to armor production, it permits fast, positive inspection and quality control procedures, providing exceedingly sharp and revealing x-ray film records through metal sections ranging up to 24 inches thick.

In operation the betatron builds up tremendous energy, developing and controlling the action of high-velocity streams of electrons producing x-rays which are focused on the cast steel parts to be filmed for inspection.

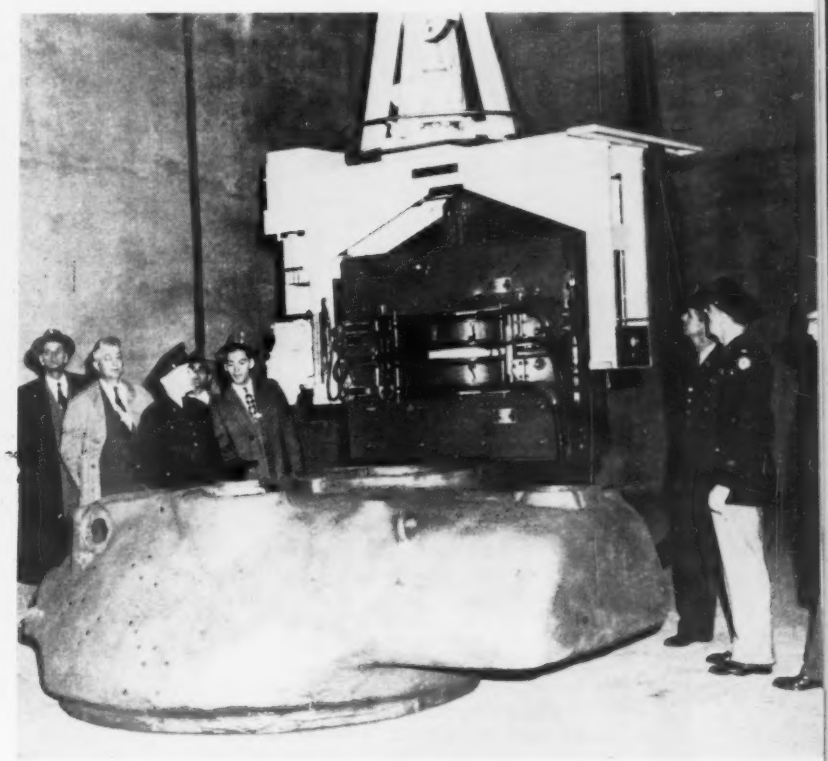
Operating on the same fundamental principles as those applying to an electrical transformer, the betatron consists of a primary coil through which high-voltage electric current is passed to energize a huge electromagnet; and a secondary, comprising a large ring-shaped vacuum tube known as a "doughnut."

Whirling electrons produced from a heated filament circle the doughnut until the whirling action attains a velocity closely approaching the speed of light as the result of the acceleration produced by the electromagnetic field. Then, when the electrons have reached their energy peak of 24,000,000 volts—whirling around the vacuum tube approximately 150,000 times every four-thousandths of a second—the magnetic field is expanded and the electrons stream from their so-called equilibrium path in the doughnut to fall upon a platinum "target." Ensuing electronic bombardment of the target material produces x-rays, which in turn are focused on the steel casting subject to inspection via subsequent examination of the resulting fast film exposure.

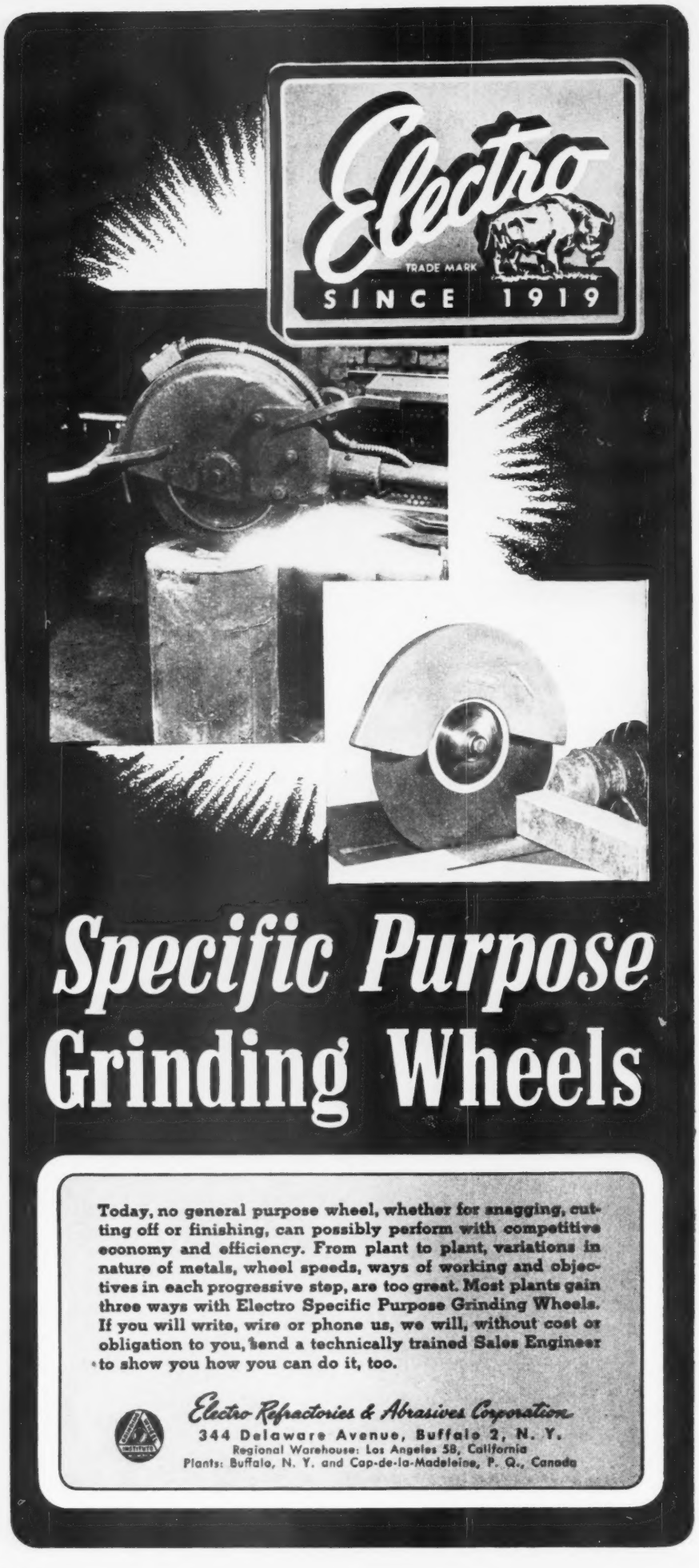
In point of size, the betatrons comprise the largest inspection instruments ever adapted to foundry



Shown at Granite City, Ill., plant are Col. B. C. Fowlkes Jr., Col. J. D. Childs, C. P. Whitehead, General Steel president (U.S. Army photo)



Betatron lowered into position for x-ray exposure of tank casting at General Steel Castings Corp., Eddystone, Pa. (Photo courtesy of the Koppers Co.)


Electro
TRADE MARK
SINCE 1919
Specific Purpose
Grinding Wheels
Today, no general purpose wheel, whether for snagging, cutting off or finishing, can possibly perform with competitive economy and efficiency. From plant to plant, variations in nature of metals, wheel speeds, ways of working and objectives in each progressive step, are too great. Most plants gain three ways with Electro Specific Purpose Grinding Wheels. If you will write, wire or phone us, we will, without cost or obligation to you, send a technically trained Sales Engineer to show you how you can do it, too.
Electro Refractories & Abrasives Corporation
344 Delaware Avenue, Buffalo 2, N. Y.
Regional Warehouse: Los Angeles 58, California
Plants: Buffalo, N. Y. and Cap-de-la-Madeleine, P. Q., Canada

practice. In each of the General Steel Castings Corp. plant installations, for example, suspension of the towering betatron requires a 7½-ton crane, which provides for lateral and transverse movement. A telescopic arm between the crane and the betatron allows vertical positioning, and the x-ray machine also may be tilted and rotated to focus rays on the desired section of the casting under inspection. Another overhead crane, of 20-ton capacity, is required for positioning the heavy armor parts, which are moved into the exposure room on a flat car.

For protection against radiation the installations are housed in a windowless, reinforced concrete building with extremely thick walls. Complicated safety measures are provided to assure the full protection of personnel at all times.

Proceedings Deal with Maintenance Problems

"Techniques of Plant Maintenance —1952" recently was published by Clapp & Poliak Inc., New York 17, which conducts the annual Plant Maintenance Conference and Show. The book contains conference proceedings and features the questions propounded by engineers from every major industry in the country who attended the sessions.

General topics include costs, inspection methods and records, planning and scheduling maintenance work, and lubrication. Chapters cover maintenance of electrical equipment; plant buildings; training maintenance workers and supervisors, and project preparation and cost control. Separate chapters offer special treatment of maintenance problems for plants employing from less than 50 to more than 800 maintenance workers. Chemical, steel and automotive plants have separate chapters.

The book sells for $6.

Issues Foundry List

Gray Iron Founders' Society, 210 National City—East Sixth Bldg., Cleveland 14, has published a directory of members, including a list of over 550 United States foundries. In addition to listing firm name and address, the directory gives type and class of foundry, capacity, product size and type of work in which foundry specializes. Other sections list foundries by states and cities and cross index executive personnel with the company name. Copies are priced at $15.

Completely New and
Proven Operating Principle

Custom Built in
any Length, Width or Depth

ADAMS CHERRY EASY-OFF FLASK

These advantages will cut your production costs!

SIDES AND ENDS finished 1⅛" on all standard size flasks. 1¼" and heavier on flasks of larger perimeters and depths. Cherry lumber is finest available; air dried.

SOLID CORNERS are machine locked to maintain alignment and to insure maximum rigidity.

MALLEABLE TRIMMINGS are another famous Adams feature; assure long life and exceptional service.

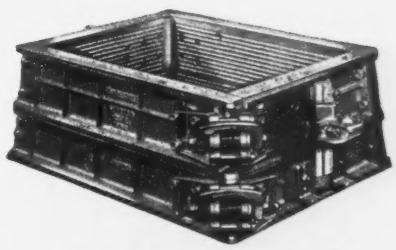
OPERATING MECHANISMS are completely new in design, yet of proven construction. Exceptionally simple, offering single-point adjustment; ease of operation on tough jobs.

ADJUSTMENTS made *only* when mechanism is in *locked* position.

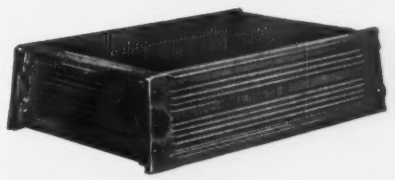
SPECIALLY DESIGNED INSERTS located in main body castings permit reversal of locking position. As "standard" flasks are furnished with handles locking in "up" position. To change, remove main bolt handles and inserts, reverse inserts and handles and reassemble.

ALUMINUM PROTECTING STRIPS are standard equipment at top of cope, bottom of drag and at parting. Steel strips available upon request at no extra charge.

WIDE "V" PINS & EARS standard on all flasks. Other types available.



Adams Aluminum Easy-Off Flask



Adams Jackets, Cast Iron or Aluminum

Adams Steel Jackets

Write today for full details . . .

Cherry Snap Flasks—Cherry Slip Flasks—Aluminum Slip Flasks—Easy-Off Flasks
Cherry Presser Boards—Wood Bottom Boards—Steel Bottom Plates—Steel Jackets
Aluminum or Cast Iron Jackets—Steel Bands—Steel Upsets—Cherry or Aluminum Upsets

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

DUBUQUE, IOWA, U.S.A.

ASTM MARKS 50th ANNIVERSARY

At Annual Meeting in New York

By EDWIN BREMER
Metallurgical Editor
FOUNDRY

DESPITE the unprecedented heat-wave which swooped down on New York during the week of June 23 to 27, over 3000 members and guests attended the 50th anniversary meeting of the American Society for Testing Materials at the Statler and New Yorker hotels. At the president's luncheon held Tuesday, delegates from 16 foreign standards' organizations were present as well as representatives from 9 governmental departments, and 95 technical and trade associations.

Meeting was addressed by President Truman S. Fuller, General Electric Co., Schenectady, N. Y., and Dr. R. E. Zimmerman, United States Steel Co., Pittsburgh. New officers of the society were introduced and included president, H. L. Maxwell, E. I. duPont deNemours & Co. Inc., Wilmington, Del.; vice president, N. L. Mochel, Westinghouse Electric Corp., Philadelphia; and directors, G. R. Gohn, Bell Telephone Laboratories Inc., New York; W. H. Lutz, Pratt & Lambert Inc., Buffalo; H. K. Nason, Monsanto Chemical Co., St. Louis; A. O. Schaefer, Midvale Co., Philadelphia, and M. A. Swayze, Lone Star Cement Corp., New York.

The society's Award of Merit for distinguished service was presented to ten individuals, including Jerome J. Kanter, Crane Co., Chicago. Recognition also was given to long-time members, and the 50-year division included Bradley Stoughton, Lehigh, Pa.; Ajax Metal Division, H. Kramer & Co., Philadelphia; International Harvester Co., Chicago, and Standard Steel Works Division, Baldwin-Lima-Hamilton Corp., Burnham, Pa. The 40-year division included Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., and Union Steel Castings Division, Blaw-Knox Co., Pittsburgh.

First Gillett Memorial Lecture was presented by N. L. Mochel on Monday afternoon, and was entitled "Man, Metals and Power." After describing some of the activities of the late Dr. Gillett in the metals' field, the speaker pointed out the developments in producing new alloys with increased physical properties as well as more resistant to higher temperatures. In power generation he stated that over the past 50 years temperatures in steam applications had risen from about 600 to 1100° F; in gas turbines still higher temperatures are encountered, and in jet operations temperatures may be 1500 to 1800° F.

At the Marburg Lecture held Wednesday afternoon R. C. McMaster, Battelle Memorial Institute, Columbus, O., spoke on "Non-destructive Testing," drawing attention to common methods such as dropping a coin on a hard surface as well as the scientific procedures of x-ray, sonic, magnetic, etc. At this session the Charles B. Dudley medal was presented to N. W. McLeod, Department of Transport, Ottawa, and the Richard L. Templin award was made to Prof. T. J. Dolan, University of Illinois, Urbana, Ill.

Of particular interest to foundrymen were the actions of various committees in promulgating a number of proposed tentative specifications and advancing several tentatives to standard status as well as making revisions in others. Committee A-3 on Cast Iron recommended to the society for publication a "Proposed Specification for Chilled and White Iron Castings" which describes test bars for determining physical properties of the chilled, and gray portions as well as the method of testing.

Committee A-1 on Steel recommended for publication five new proposed tentatives, including one on steel castings, and the revision of 35 tentatives, including one relating to steel castings. The revision applied to "Tentative Specifications for Mild- to Medium-strength Carbon-steel Castings for General Application" (A27-50T), and consisted of revising the table of unspecified alloying elements to read as follows:

Copper, max, per cent	0.30
Nickel, max, per cent	0.50
Molybdenum, max, per cent	0.20
Chromium, max, per cent	0.20[a]

[a] For each reduction of 0.01 per cent carbon under the maximum specified, an increase of 0.04 per cent chromium above the maximum specified will be permitted, but in no case will the chromium exceed 0.40 per cent. No change is recommended on the other chemistry or the carbon-manganese relationship.

The new "Proposed Tentative Specifications for Heavy-walled Carbon and Low Alloy Steel Castings for Steam Turbines" relates to ferritic steel castings for cylinders (shells), valve chests, throttle valves and other heavy-walled castings for steam turbine applications with wall thicknesses over 1 in. It covers ten grades of steel, including plain carbon, Mo-steels, Mo-V type, Cr-Mo, and Cr-Mo-V types. Use of aluminum is prohibited except in case of the plain carbon steel, but by agreement between manufacturer and purchaser the use of aluminum in any grade may be waived. Details relative to this specification appear on pages 187 and 188.

Committee A-7 on Malleable Iron Castings recommended revision of one section of "Standard Specifications for Malleable Iron Castings" (A47-48), to permit greater freedom in relation to cast-on test coupons. The section and revision is as follows:

7. *(a)* If specified by the purchaser, or if their inclusion is standard practice, as in the case of some railroad castings, test lugs shall be cast on all castings of sufficient size to permit their incorporation. They shall be of a size proportional to the thickness of the casting. On castings which are 24 in. or over in length, a test lug shall be cast near each end. The test lugs shall be attached to the castings at such locations that they will not interfere with the assembling of the castings, and may be broken off by the inspector.

Committee B-5 on Copper and Copper Alloys, Cast and Wrought recommended for publication a new "Proposed Tentative Specification for Copper-base Alloy Centrifugal Castings" which covers 32 alloys in 14 classifications such as leaded high-strength yellow brass, tin bronze, etc. It also made revisions in 12 standards relating to castings. Most important was the following change to be made in the appropriate sections:

13. Castings that show injurious defects revealed by machining operations subsequent to acceptance may be rejected, and if rejected, the foundry shall be notified within 30 days. The full weight of the original material rejected shall be returned to the foundry. The foundry shall not be responsible for the costs of machining defective castings.

Standards affected included "Standard Specification for Bronze Castings for Bridges and Turntables" (B22-51); for Steam or Valve Castings (B61-51); Composition Brass or Ounce Metal Castings (B62-51); Bronze Castings in the Rough for Locomotive Wearing Parts (B66-49); Car and Tender Journal Bearings (B67-49); and Leaded High-strength Yellow Brass (B132-49).

Other standards to which the revision applies are those for Tin-bronze and Leaded Tin-bronze (B143-49); High-leaded Tin-bronze (B144-49); Leaded Red Brass and Leaded Semi-red Brass (B145-49); Leaded Yellow Brass (B146-49); High-strength Yellow Brass and Leaded High-strength Yellow Brass (B-147-49); Aluminum Bronze (B148-49); Leaded Nickel-Brass (B149-49), and Silicon Bronze and Silicon Brass (B198-49).

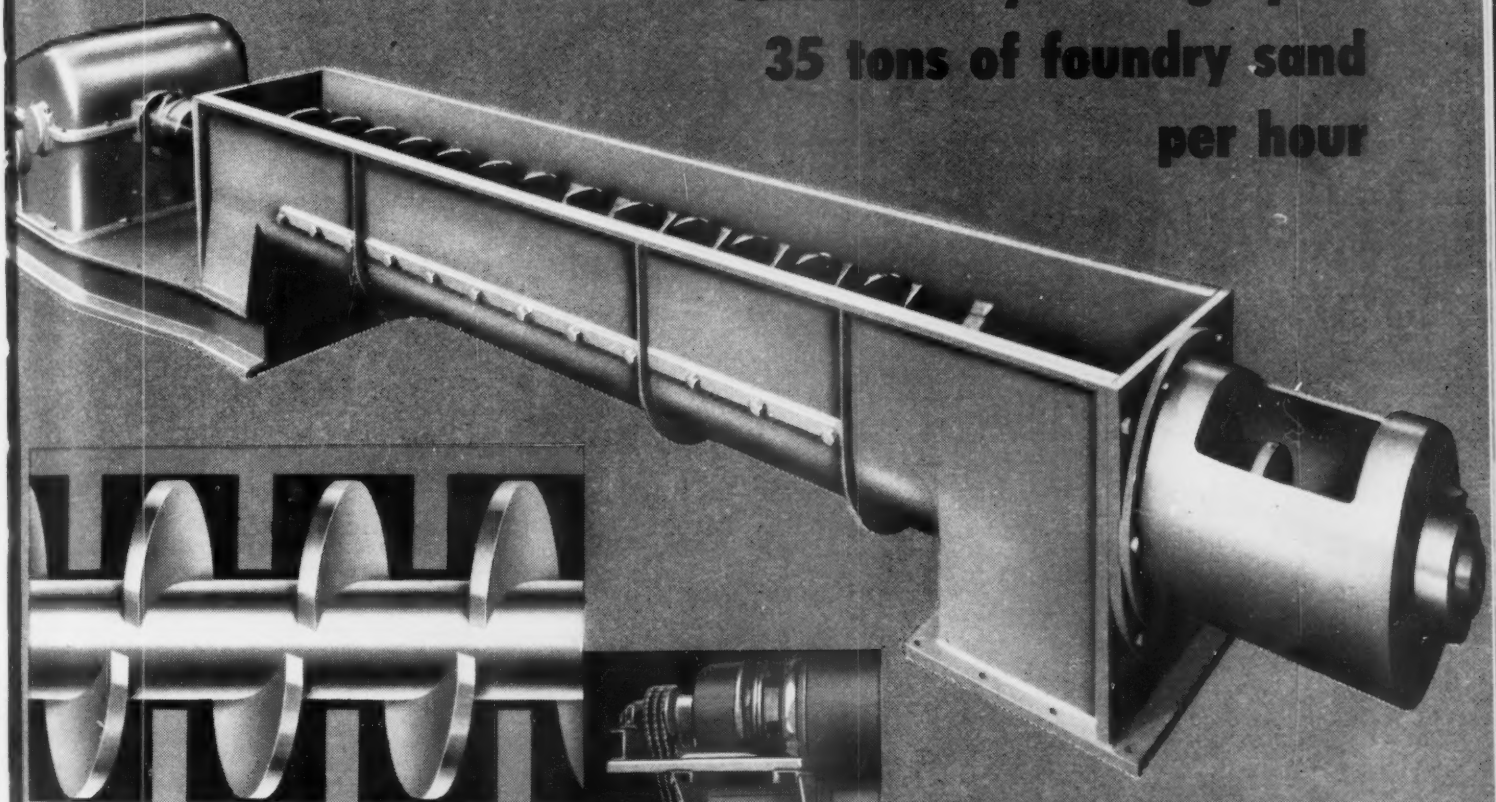
Committee B-7 on Light Metals and Alloys, Cast and Wrought recommended publication of a new "Proposed Tentative Recommended Practice for Codification of Light Metals and Alloys, Cast and Wrought" which uses not more than two letters repre-

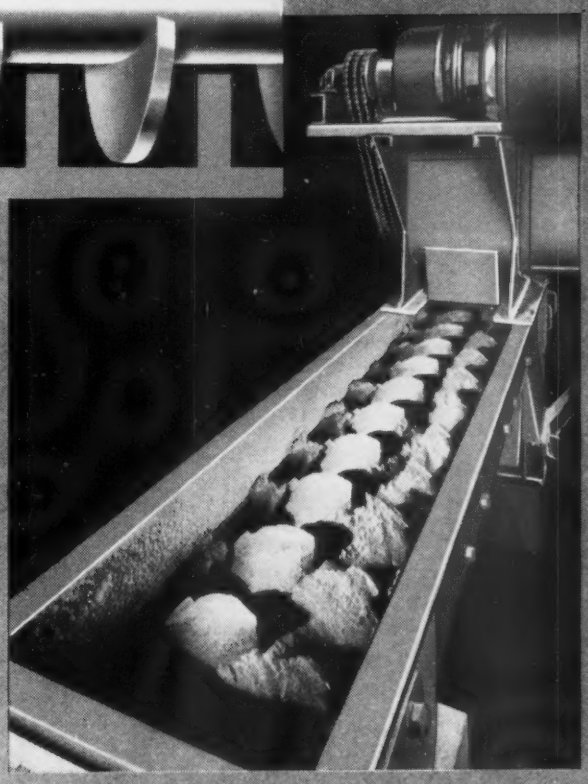
(*Concluded on page* 214)

Baker Perkins Ko-Kneader

(LIST SYSTEM)

an efficient new unit for continuously mixing up to 35 tons of foundry sand per hour





B-P Ko-Kneader in operation handling foundry sand

With revolutionary Baker Perkins Type M List System Ko-Kneaders, continuous mixing of foundry sand becomes a highly practical operation. Essentially, the Ko-Kneader is a mixing worm revolving as well as reciprocating in a trough provided with kneading teeth in such a way that the mixing worm works as a single mixing machine with each tooth. The repetition of this operation, as the sand moves along the trough, completes the mixing and mulling. Baker Perkins Ko-Kneaders save considerable mulling time and also help to improve casting quality because the intense mixing action blends the sand uniformly and thoroughly. Baker Perkins Ko-Kneaders are ruggedly built for long life and dependable service. When used with specially designed Baker Perkins Feeders, operation of the Ko-Kneader is almost entirely automatic, resulting in substantial savings in labor costs. Consult a Baker Perkins sales engineer or write today for complete information.

BAKER PERKINS INC. foundry equipment sales • saginaw, michigan

(*Concluded from page* 212)

senting the alloying elements in greatest amount, arranged in order of decreasing percentage followed by respective percentages rounded off to whole numbers and a serial letter. Letters representing alloying elements are as follow:

A—Aluminum	M—Manganese
B—Bismuth	N—Nickel
C—Copper	P—Lead
D—Cadmium	Q—Silver
E—Rare Earths	R—Chromium
F—Iron	S—Silicon
G—Magnesium	T—Tin
K—Zirconium	Z—Zinc
L—Beryllium	

The committee also revised a number of specifications relating to castings. In those for Aluminum-alloy Sand Castings (B26-50T), and for Aluminum-base Alloy Permanent Mold Castings (B108-50T), new tables were added for general information only, and give data on properties and characteristics of some 20 alloys. Those include pattern shrinkage, melting range, resistance to hot cracking, pressure tightness, fluidity, solidification shrinkage tendency as well as such characteristics as corrosion resistance, machinability, polishing, plating, and several others.

Committee B-6 on Die-cast Metals and Alloys recommended revision of several tentative and standard specifications to incorporate the Frankford Arsenal code identification system, and those include Aluminum-base Alloy Die Castings (B85-50T); Zinc-base Alloys in Ingot Form (B240-49T); Magnesium-base Alloy Die Castings (B94-49T) which is being advanced to standard status; Zinc-base Alloy Die Castings (B86-48); Lead and Tin-base Alloy Die Castings (B102-48); and Copper-base Alloy Die Castings (B176-50).

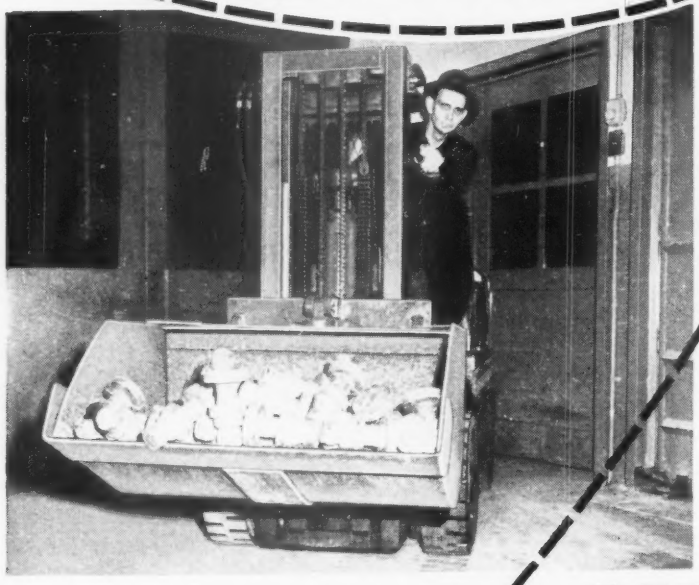
Committee A-10 on Iron-chromium, Iron-chromium-nickel and Related Alloys recommended a new "Proposed Tentative Specification for Iron-chromium and Iron-chromium-nickel Alloy Tubular Centrifugal Castings for General Applications". Committee E-7 on Non-destructive Testing recommended that the tentative for "Industrial Radiographic Standards for Steel Castings" (E71-47T) be adopted as a standard without revision.

Committee A-9 on Ferroalloys recommended the following tentatives be advanced to standards: "Ferroboron" (A323-50T) and "Ferrotitanium" (A324-50T). Committee E-1 on Methods of Testing proposed a new standard for publication entitled "Hardness Conversion Table for Nickel and High-nickel Alloys" which includes diamond pyramid, brinell and several Rockwell hardness designations. It also proposed a new "Tentative Method of Test for Diamond Pyramid Hardness of Metallic Materials". Committee E-3 on Chemical Analysis of Metals recommended that "Tentative Methods for Chemical Analysis of Steel" (E30-50T), covering procedures for boron, beryllium and tin, be advanced to a standard.

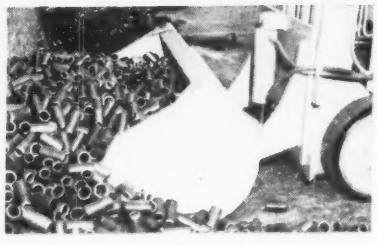
Marks 50th Anniversary

Latest issue of "The Lufkin Line" features an elaborate presentation, text and illustration, to celebrate the 50th anniversary of the founding of the Lufkin Foundry & Machine Co., Lufkin, Tex. On Feb. 17, 1902 a group of five men organized a little repair shop for railroad and saw mill machinery. Today the company is considered the largest manufacturer of oil field equipment in the South; it is capitalized at $5,000,000 and has a daily melting capacity of 172 tons in the foundry. In 1905 W. C. Trout, a traveling representative of the Allis-Chalmers Mfg. Co., became secretary of the company. His dynamic leadership continued without interruption until his death in 1947. His son, Walter W. Trout, succeeded him as president.

JOBS LIKE THIS ARE A "SNAP" for your fork trucks...



...when equipped with ALLEN Hydraulic SHOVELS



That's right! Handling sand, limestone, other materials... moving castings in bulk lots... clean-up work... charging furnaces... are all in a day's work for your fork trucks when equipped with the ALLEN Hydraulic SHOVEL attachment. What's more... the efficiency of your trucks for regular fork operations isn't impaired... it takes only five or ten minutes to attach or detach the ALLEN Hydraulic SHOVEL. Result? Your fork trucks become multi-purpose machines... with resultant greater savings for you.

Investigate the ALLEN Hydraulic SHOVEL... a low-cost investment that pays big dividends... as dozens of foundries will testify.

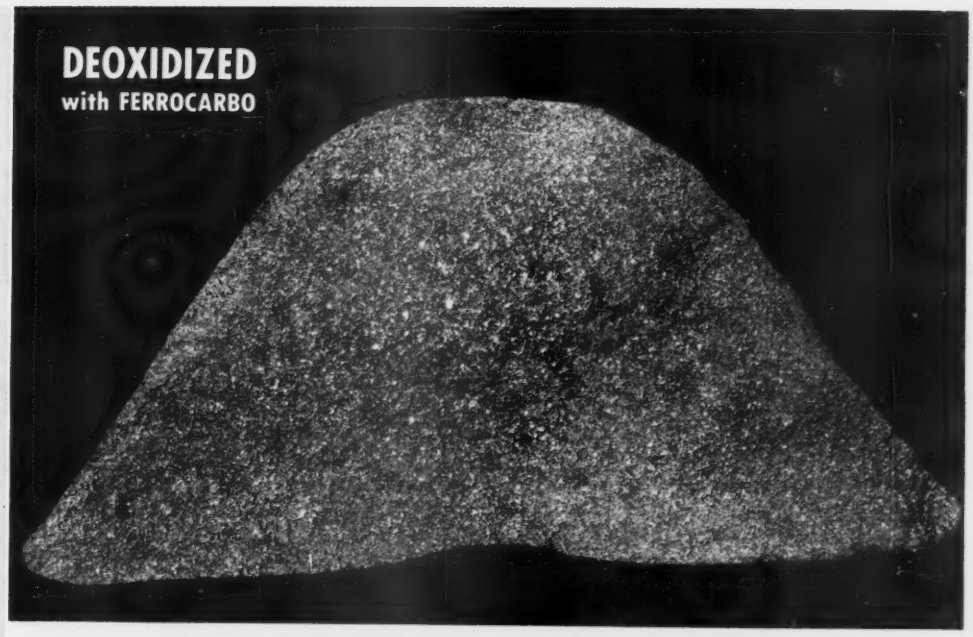
EXCLUSIVE straight-line mounting transmits loading force from tip of blade direct to truck's drive axle... prevents damage to shovel's double-acting hydraulic cylinder and truck's tower. Shovel contour assures full bucket with less effort. Dumping speed can be easily regulated, an advantage in weighing or measuring batches. Capacities: 9 to 17 cu. ft.

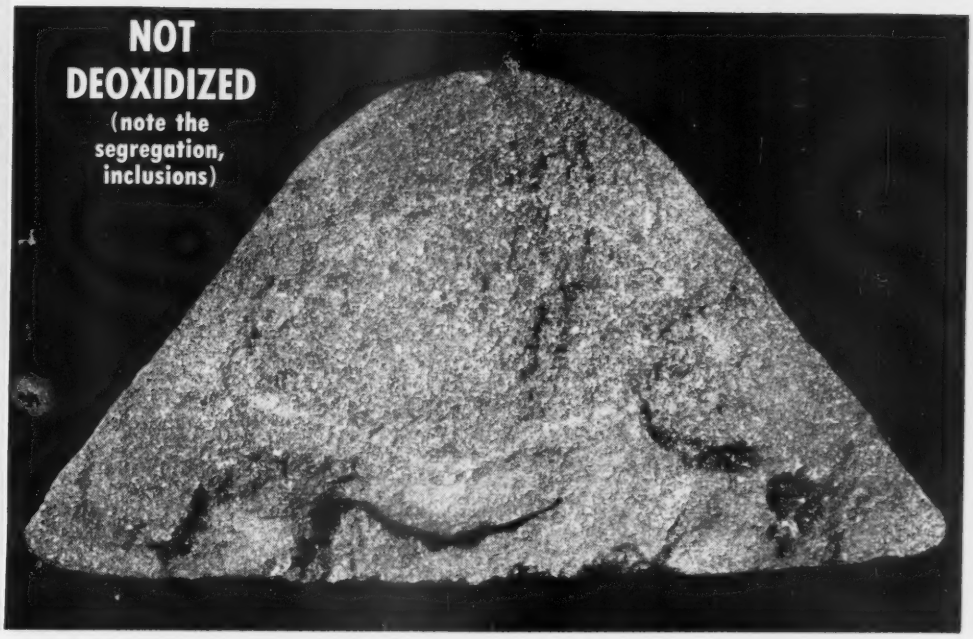
Specify make of your trucks... or see your fork truck dealer.

ALLEN INDUSTRIAL PRODUCTS, INC.

100 LIBERTY STREET, BATTLE CREEK, MICHIGAN, U.S.A.

THESE TWO PIGS HAVE A MESSAGE FOR YOU





...even if you use a 100% pig iron charge, you need FERROCARBO Briquettes to make your castings sound

FERROCARBO

TRADE MARK

Briquettes

by CARBORUNDUM

make your castings CLEANER...MORE UNIFORM...MORE WEAR RESISTANT...MORE RESISTANT TO THERMAL SHOCK...EASIER TO MACHINE (extra tool life)

"Carborundum" and "Ferrocarbo" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York.

PHONE OR WRITE THE FERROCARBO DISTRIBUTOR NEAREST YOU

KERCHNER, MARSHALL & CO.
PITTSBURGH
Cleveland, Birmingham, Philadelphia and Buffalo

MILLER & COMPANY
CHICAGO
St. Louis and Cincinnati

FERROCARBO Briquettes are manufactured under U.S. Patents 2,119,521 and 2,497,745. U.S. Patent 2,020,171 covers a process of making cast iron through the utilization of FERROCARBO.

Made in Canada by
CANADIAN CARBORUNDUM COMPANY, LTD.,
Niagara Falls, Ontario

Distributed by WILLIAMS & WILSON, TORONTO, Montreal and Windsor

and by KERCHNER, MARSHALL & CO., Buffalo, N. Y.

Use of Perchloric Acid

(*Concluded from page* 95)

sible for one analyst to carry out a number of different determinations at the same time with a minimum amount of effort. Another advantage of this compact hood construction is that one hot plate can serve both hoods.

A small portable stainless steel tray (Fig. 2-A) is used to flick on watch glasses after determinations have completed fuming. Two small stainless steel shelves (Fig. 2-B) are also installed within the perchloric acid fuming hood to set on beakers after removing watch glasses to a tray. This is done so that all determinations may be treated under the perchloric acid fuming hood with additional acid or water, or until no more perchloric acid fumes are given off before removing to filter or to dilute.

A portable damper (Fig. 1) is wedged between the top of the hot plate and fuming hood duct outlet during cold weather when fuming hood is not in use. This is done to eliminate any excessive cold draft which may be drawn in by the exhaust outlet of the general purpose hood. This hood runs continuously during working hours, while the small fuming hood is operated only intermittently. The portable damper eliminates having a permanent damper installed within the duct outlet (which would, in itself, be an obstruction to some extent) and would also be a place for condensed chemical salts to collect. As a result, corrosion may be excessive at that point.

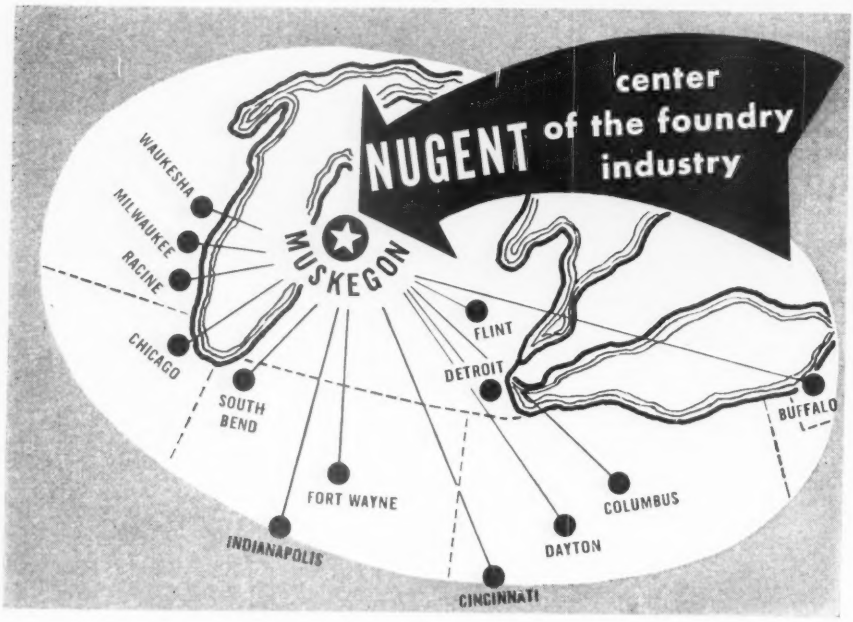
Handling Perchloric Acid—Another important factor is the storage of the acid. It should be stored in an isolated area away from any heat or organic material. We have designed an all-metal storage chest for this reason. The chest is designed to hold twelve 7-pound bottles of perchloric acid, and each bottle is placed in a gallon crock to trap its contents in case of breakage. Only one bottle is kept in the laboratory at a time and similar safety precautions, as stated above, are applied.

Perchloric acid should never be used on or around wooden table tops or floors. Discolored acid (which means the acid has been contaminated by an outside substance) should be disposed of at once by flushing with a large volume of cold tap water. Perchloric acid should never be used alone for dissolving any material unless past experience has proved it can be done. It should be used in connection with water, mineral acid, or a combination of the two as a dissolving agent. As a matter of safety, it may be good advice not to improvise admixtures of perchloric acid until their explosive nature has been investigated.

Perchloric acid fumes condense and deposit in combination with other chemical deposits and foreign combustible residues, such as dust which may be drawn into a hood, trapped there and allowed to accumulate over a period of time. This may be similar to gun powder and explode violently if ignited by heat in a confined space.

While perchloric acid should be used and handled with caution, we do not feel that it is hazardous when its properties are understood and adequate safety factors are applied. This is based on 20 years' experience handling perchloric acid in the laboratory.

Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, will conduct its sand school Aug. 11-13 at Rackham Memorial Bldg., Detroit. Classes are held from 9 a.m. through 4 p.m. free of charge.



...a convenient source of prime core sand

Prompt shipments are no problem with Nugent customers. Each day Nugent routes carloads of Cannon Brand Graded Core Sand to the heart of the foundry industry. Three main railroads out of Muskegon place plenty of dried and screened quality core sand at your foundry when you need it.

Bulk storage facilities are also available at our plant, for your convenience pending shipment.

Call or write your Nugent Representative today

INDIANA PRODUCTS CO. Kokomo, Indiana
WARNER R. THOMPSON CO. Detroit 8, Michigan
KEENER SAND & CLAY CO. Columbus 15, Ohio
CARPENTER BROTHERS, INC. Milwaukee 3, Wisconsin
GREAT LAKES FOUNDRY SAND CO. Detroit 26, Michigan

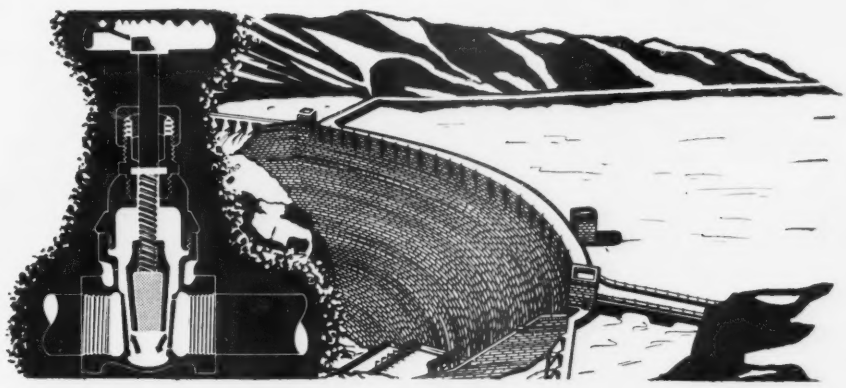
or write direct to:

1912 **CANNON** core sand 1952

THE NUGENT SAND COMPANY, INC. **MUSKEGON, MICHIGAN**

Why *Brass* can better serve your needs

PROVEN *Pressure* TIGHTNESS



BRONZE CASTINGS ARE USED TO CONTROL FLOW PROBLEMS IN INDUSTRY . . . .

Bronze and nickel silver valves meet the requirements of many industrial flow control problems. First, because of the satisfactory engineering properties: pressure tightness, strength, ductility, and resistance to corrosion and erosion. Second, because of low foundry costs and excellent machinability. And third, because of their dependable service and long life.

Cast bronze meets the requirements of industry and consumer.

FREE . . . Write for your copy of the 8-page Lavingot Technical Journal — Vol. 8, No. 2 — containing an article discussing "Refining Secondary Copper Alloys."

Specify—LAVIN NONFERROUS INGOT—*Quality*

Brass · Aluminum · Bronze · Zinc Base Die Casting Alloys ·

R. LAVIN & SONS, INC.

- *Refiners of Brass, Bronze and Aluminum*
- *Producers of Zinc Base Die Casting Alloys*

3426 S. KEDZIE AVENUE • CHICAGO 23, ILLINOIS

REPRESENTATIVES IN PRINCIPAL CITIES

R. LAVIN & SONS, INC. 1900 52 Years 1952 SERVING THE FOUNDRY INDUSTRY

DR. C. J. DADSWELL
President

E. LONGDEN
Senior Vice President

JOHN BELL
Junior Vice President

Annual Conference Held by Institute of British

By VINCENT DELPORT
European Manager
FOUNDRY

A RECORD number of members and visitors attended the 49th annual conference of the Institute of British Foundrymen, held at Buxton and Sheffield, June 10-13. Meetings of the council and of various committees of the institute took place on Tuesday, June 10, and, in the evening, members got together on the occasion of an informal reception and dance at the invitation of the Mayor of Buxton and the Mayoress, the Duke and Duchess of Devonshire.

The formal proceedings started the morning of June 11, with the annual general meeting of members of the institute, President Colin Gresty presided. Among the foreign visitors to whom the president extended his greetings, were John Sissener, president of the Norwegian Foundry Association and consulting engineer with United Nations; J. J. Dewez, who presented the exchange paper from the Belgian Foundry Association, and G. A. Lillieqvist, who had come from the United States to present the exchange paper from the American Foundrymen's Society. There were also visitors from Australia, France and Switzerland.

The annual report, presented by Secretary Tom Makemson, disclosed that the membership of the institute had risen from 4773 on Apr. 30, 1951 to 4917 on Apr. 30, 1952. The number of subscribing firms had increased from 227 to 232. The report of Technical Council followed, presented by its chairman, A. E. Peace. Five new technical subcommittees were appointed during the 12 months ended Apr. 30, 1952, bringing the number of active subcommittees to 11 The subjects now being investigated are: Ingates; Internal Stress; Pyrometric Method of Investigating the Rate of Solidification of Cast Iron; Cast Iron Tests and Specification; Copper-Base Alloy Castings; Mold Drying; Atlas of Nonferrous Microstructures; Atlas of Typical Steel Microstructures; Atlas of Typical Cast Iron Microstructures; Cupola Development; Receivers.

During the past year the subcommittees dealing with Flow of Metals, and Cupolas, completed their work; the report on Flow of Metals was presented at the meeting, and also a report from the subcommittee on Internal Stress. The president then announced the awards of medals for 1952. Recipients and their biographies are listed on the facing page.

Diplomas were awarded to the following members: S. L. Finch, for his paper "Process Planning in the Steel Foundry Industry" presented to the Tees-Side Branch; J. Gorman, for his paper "A Cross-section of a Non-Ferrous Jobbing Foundry" presented to the Scottish Branch; E. J. Brown, for his paper "Castings to Resist Abrasive Wear" presented to the Lancashire Branch; D. F. B. Tedds, for his paper "Experiences with the Investment Casting Process" presented to the Birmingham Branch.

The president presented certificates of honorary membership to C. W. Bigg, past president of the institute, who had served as honorary treasurer for a number of years, and to Daniel Sharpe, of Glasgow, a past president of the institute. These certificates were received by A. E. Peace and John Bell owing to the unavoidable absence of the recipients.

The meeting then proceeded to the election of officers for 1952-53. Dr. Cyril J. Dadswell, director of the English Steel Corp. Ltd., Sheffield, was elected president. E. Longden, of Manchester, was elected senior vice president. John Bell, of Glasgow, was elected junior vice president. The following five members were elected as members of the Council for two years: Dr. A. B. Everest, London; H. G. Hall, Birmingham; R. L. Handley, Manchester; A. E. Peace, Derby; R. C. Shepherd.

A vote of thanks to the retiring president, Colin Gresty, was proposed by Dr. Dadswell and seconded by past president Noel Newman, and adopted with acclamation. Dr. Dadswell, the incoming president, then took the chair and delivered his presidential address, to which he had given the title "A Sense of Proportion." His object was to put in proper perspective certain things which do not yet appear to be thoroughly understood or to be approached with an open mind.

Dr. Dadswell referred to a question raised at the fourth Foremen's Training Course which seemed to require an answer but which it was not

ish Foundrymen

possible to provide in the time available. A foundry was described in which a somewhat difficult casting had been made in small quantities by skilled molders, with considerable physical effort on their part. Eventually, by various means but with fewer men and less skilled men in the team, output was increased ten fold. One of the questioners was worried about the effect of mechanization on the operators, stating that the skilled molder had been deprived of skilled work, although actually the displaced molders were transferred to alternative work where their skill was still required.

It is wrong, said Dr. Dadswell, to assume that mechanical aids to production necessarily make those who operate them unhappy when they are not able to exercise their original craftsmanship, provided the operators are able to work steadily and with a physical exertion which is not injurious to health.

As foundrymen, he said, our primary objective is to make good castings. If, therefore, to achieve this object it is necessary to use labor which is not trained to do a hundred and one skilled jobs but becomes specialized in doing a few, we must not assume that such labor is unhappy. It has been proved in other trades that he is otherwise and that his economic standard can rise because he participates through his increased

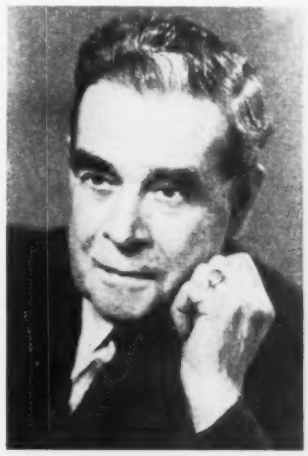
(*Continued on page* 222)

1952 Medalists of the IBF

A. E. PEACE
. . . *E. J. Fox Medal*

H. G. HALL
. . . *Oliver Stubbs Medal*

K. H. WRIGHT
. . . *British Foundry Medal*



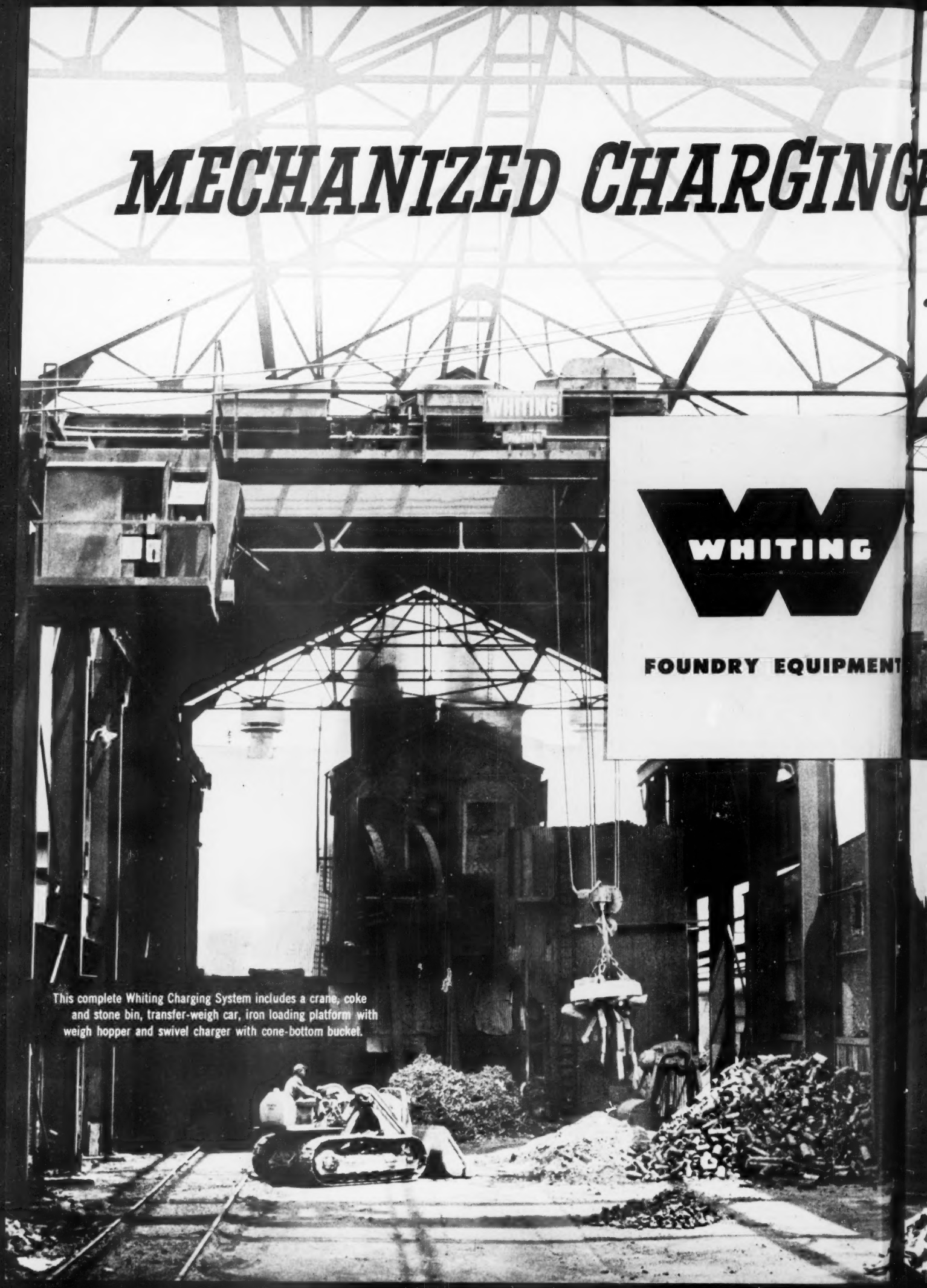
JOHN JACKSON
. . . *Meritorious Service Medal*

A. E. Peace, chairman of the Technical Council Institute of British Foundrymen was awarded the institute's E. J. Fox Medal for 1952. It recognizes Mr. Peace's work in improving foundry technique, particularly in the malleable iron foundry industry, and his distinguished work as head of the institute's technical investigations. Educated at Sir. Thomas Rich's School and Glouster County Analyst's Laboratory, he was engaged in laboratory work at various foundries until he became chemist and metallurgist and later a director of Ley's Foundries & Engineering Co. Ltd., and its subsidiaries, Ley's Malleable Castings Co. Ltd., and Ewart Chainbelt Co. Ltd., Derby. He is a member of the Technical Committee, Council of Foundry Associations, and chairman of the Research Board, the Fundamental Research, and Industrial Committees of the British Cast Iron Research Association.

H. G. Hall is the 1952 recipient of the Oliver Stubbs Medal, in recognition of his services in imparting knowledge to fellow members on practice and theory of founding in a series of papers extending from 1940-1949 and of his contributions to the malleable industry technique. Mr. Hall received his technical education at Birmingham Central Technical College and from 1928 to 1937 was associated with Midland Motor Cycle Co. Ltd., Rubery Owen & Co., and Shotton Bros. Ltd. In 1937 he became chief metallurgist, Castings Ltd., Walsall, and since 1945 has been technical director there. He is a past president of the Birmingham Branch of the IBF and is a keen advocate of facilities afforded by the National Foundry College and National Foundry Craft Training Center, having definite views on need for training in the foundry industry.

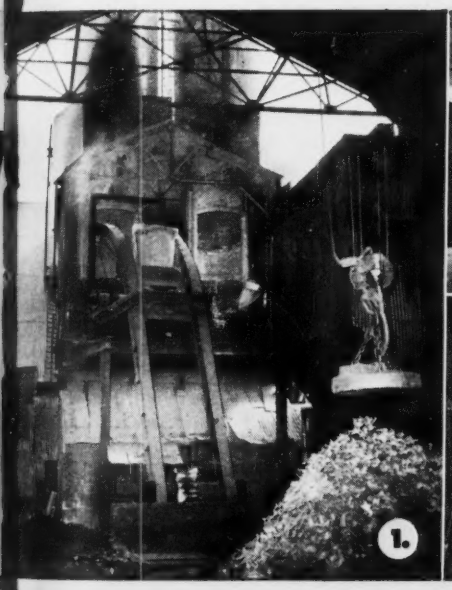
K. H. Wright was presented the 1952 British Foundry Medal and Prize, given annually by the Council to the author of the paper adjudged to be the best presented during the preceding year. Mr. Wright's paper, "Chilled Roll Manufacture," was published in the recently issued volume of the IBF Proceedings. Mr. Wright received his technical training at Derby Technical College and Country Technical College. He was appointed research manager for the Midland group of British Rollmakers Corp. Ltd., and upon completion of its plant at Crewe was named research manager for the new organization, Midland Rollmakers Ltd. Mr. Wright is president of the Staffordshire Iron and Steel Institute and has been a member of the IBF since 1937.

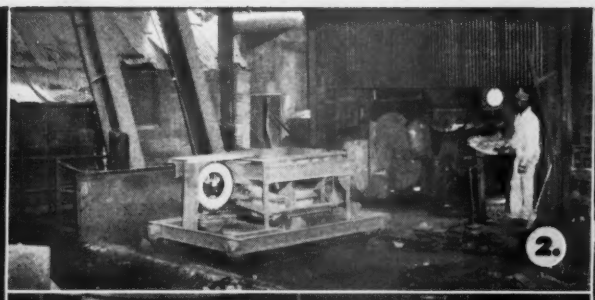
John Jackson is the winner of the Meritorious Services Medal in recognition of his service to the institute and individual members for over 30 years. Mr. Jackson became associated with the institute in 1922, when, in addition to his duties as production manager at Howard & Bullough Ltd., Accrington, he was appointed in charge of its four foundries. In 1946 he retired from the position of general works manager of the company, which he had held for many years. He was president of the Lancashire Branch of the IBF in 1935 and is now president-designate of the Burnley Section. He has also served on the General Council of the institute and has been interested in apprentice training for engineering and foundry work.

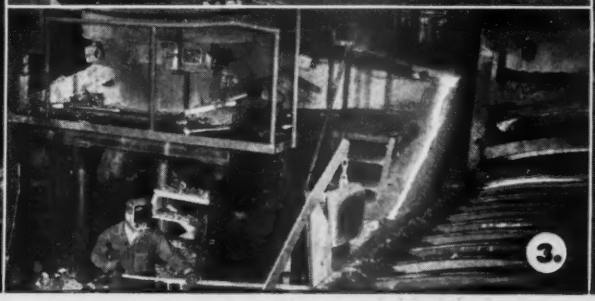

MECHANIZED CHARGING
WHITING
WHITING
FOUNDRY EQUIPMENT
This complete Whiting Charging System includes a crane, coke and stone bin, transfer-weigh car, iron loading platform with weigh hopper and swivel charger with cone-bottom bucket.

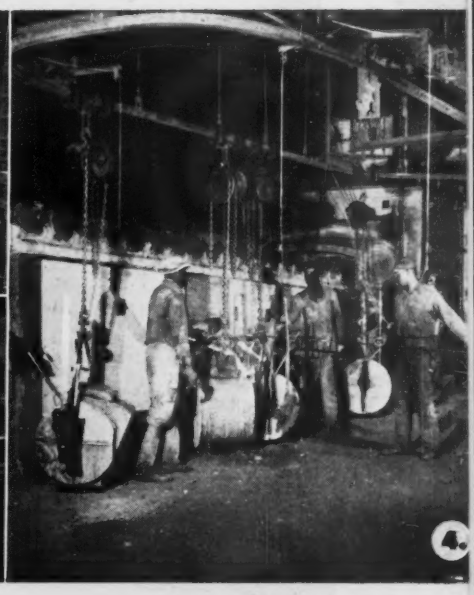
IGEFFICIENT MELTING

...help Eberhard cut costs!









1. The Whiting cone-bottom, controlled-discharge bucket assures the most desirable charge distribution in the cupola.

2. The transfer-weigh car is dumping coke and stone into the cone-bottom bucket located in the pit below.

3. The popular malleable duplexing operation . . . cupola-to-air furnace.

4. Tapping from the air furnace into Whiting insulated, covered, cylindrical transfer ladles.

Eberhard Mfg. Co., Cleveland, produces *high quality* malleable castings in large quantities *at low cost*. Largely responsible for this is their effective use of Whiting charging and melting equipment. The entire Whiting Charging System requires only *two men*—the crane operator and the skip hoist operator. Previous to this installation, when charge make-up was manual, *eleven men were required!*

Charging operations start with a Whiting crane carrying scrap and pig iron to the weigh hopper. This crane also loads a bin with coke and stone which are discharged into a transfer-weigh car, brought to the loading point and discharged into the cone-bottom charging bucket. The bucket, when loaded with all materials, travels up the swivel charger to either of the two cupolas.

Cupola-to-air furnace duplexing enables Eberhard to have a *continuous* supply of hot metal, with *improved control at lower cost!* Write today for information on Whiting Charging and Duplexing Systems.

WHITING CORPORATION 15607 Lathrop Ave., Harvey, Illinois

OTHER WHITING FOUNDRY PRODUCTS INCLUDE:

Cupolas • Cupola Spark Supressors • Cupola Hot Blast Equipment • Cupola Moisture Control Equipment • Cupola Charging Systems • Cupola Coke Igniters • Cradle Furnaces • Converters (Steel) • Duplex Melting Systems • Air Furnaces • Electric Melting Furnaces • Ladles • Ladle Handlers • Wet-type Dust Supressors • Tumbling Mills • Annealing Ovens and Cars • Pulverizers • Pulverized Coal Firing Systems • Turntables • Electric Traveling Cranes • Trackmobile • Trambeam Overhead Handling Systems • Electric Chain Hoists

NEED A *Well-Made PATTERN?

Complicated Well-Made pattern for large automotive use.

Well-made pattern for military use.

One corner of our well-equipped Pattern Plant.

It's simple if you do. Just specify a *Well-Made. Almost a half century of experience on wood and metal.

*Copyrighted Trade Name

The WELLMAN Bronze & Aluminum Co.

DEPT. 7, 12800 SHAKER BLVD.
CLEVELAND 20, OHIO

(Continued from page 219)

productivity in a greater contribution to the total quantity of goods available for the use of mankind.

Dr. Dadswell believes that, in spite of mechanical aids to production, there will continue to be a need for skilled craftsmen. In many instances there are as yet no alternative ways of making molds and cores, other than by the use of craftsmen. There will remain a need for craftsmen for work of accuracy and in small quantity which is dependent on the skills of the individual.

Dr. Dadswell suggested that in the jobbing foundry there is still scope for improvement as compared with other branches of our industry. Mechanization, elaborate or simple, is not difficult to apply, given the type of product to which it is suited and imagination and economic conditions to justify it. Not nearly enough has been done to help the management and technicians in the jobbing foundries. This year the organizers of the Foremen's courses tried to break away from the stress on mechanization by having some examples of controlled quality in jobbing foundries.

The method of approach is nothing more than the keeping of records, doing simple investigations, making deductions from records, and using no elaborate statistical analysis other than logic based on causes and effects. Anyone can undertake this, whether having an elaborate laboratory or a simple organization. The mental processes involved, and the scientific knowledge required, are those which a foundryman who has studied as he should have studied would be able to undertake, the principal factor being analytical thought. Logical thought, and "scientific management" can be and should be applied to the jobbing foundry just as much as to any other foundry. It will train the craftsmen of the future and it will absorb those who have been trained.

The president next called upon Prof. R. J. Sarjant, professor of fuel technology, University of Sheffield, to present the Edward Williams Lecture. Professor Sarjant's subject was "Fuel and Metal." He covered the subject from the point of view of the fuel requirements of the foundry industry, dealing mainly with furnace coke. He described the characteristics and properties of coke used for iron melting in the cupola and reviewed research work done to improve the quality of coke and to obtain satisfactory coke from coal not entirely suitable as coking coal. He

laid special stress on the effect of coke reactivity, and stated that he considered the reactivity factor of main importance.

On June 13 a number of works visits were organized in and around Sheffield, including Newton Chambers & Co. Ltd., Edgar Allen & Co. Ltd., English Steel Corp. Ltd., Osborn Foundry & Engineering Co. Ltd., Sheepbridge Equipment Ltd., David Brown Foundries Co., Hadfields Ltd. and Brightside Foundry & Engineering Co. Ltd.

The annual banquet on June 11, was attended by some 560 members and guests. The principal guests were the Mayor and Mayoress of Buxton, the Duke and Duchess of Devonshire; the Lord Mayor and Lady Mayoress of Sheffield; the Master Cutler and Mistress Cutler of Sheffield; T. Summerson, chairman of the British Steel Founders Association, and Mrs. Summerson.

Seventeen technical papers were presented and discussed at the various sessions. These will be reviewed in a future issue.

Bonding Clays in Sand

(*Continued from page* 91)

a "filler" it may very well give another result in the foundry.

Consider other cases where all active clays are used:

	C	D	E
Michigan lake sand	32 lb	32 lb	32 lb
Bank sand	4	4	4
Dextrine	¼	¼	¼
Bonding Clay	1⅛	1⅛	
China Clay			1
Western Bentonite	⅛	⅛	¼
Corn flour	1/16	1/16	1/16
Properties:			
Moisture	6.6%		7.0%
Permeability	100		140
Green strength	.9 lb		1.1 lb
Tensile strength	80 psi		78 psi

Mixture C was tempered and mulled six minutes after all ingredients had been added dry. Mixtures D and E had the clay, bentonite and corn flour added in the form of a slurry. The results are shown in Fig. 7 where the mixtures made up with the thixotropic gel showed superior foundry results.

A number of other commercial bonding clays were tried varying from those predominating in the illite type of clay to those predominating in the kaolinite constituent. In all cases, foundry results were superior where the clay was added as a slurry.

The case which will probably illustrate this point most forcibly was a situation in a South American foundry during the last war which was cut off from its source of stove plate sand. It was necessary to make up a synthetic sand for jobs similar to the one shown in Fig. 10. Rat-tails would form on the cope side on broad flat surfaces. The fact that these defects were due to uneven sand expansions was proved in experiments in which a rib would be placed several inches in front of the gate. This would act similar to an expansion crack and the buckle (rat-tail) would be eliminated at the particular locality but would be moved further out. Soft ramming of the cope was helpful but there was a limit to this and the trouble was not eliminated.

The clay bond used in the facing consisted of equal proportions of bentonite and finely ground fireclay mixed by means of a muller in the usual way. When the clay was added in the form of a slurry, it was found that 40-50 per cent less bentonite and clay was needed and the buckles disappeared from the castings. Apparently, adding the clay in this form not only increased its efficiency but duplicated more nearly the clay distribution in a good natural molding

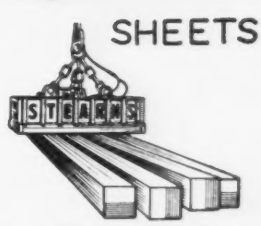
SAVE TIME SAVE LABOR

SCRAP

PIG IRON

ROUNDS

SHEETS



BILLETS

"Small Bite—Big Load"

LIFTING and transporting these two huge steel castings (each weighing 4000 pounds), is everyday work for this STEARNS Lifting Magnet at the Maynard Electric Steel Casting Co., Milwaukee. This 45" diameter circular magnet is one of a team of STEARNS Lifting Magnets used throughout the cleaning room and foundry whenever castings have to be moved — doing the job efficiently and economically year in and year out.

If you handle castings, borings, turnings, pig iron, strip steel, rails, slabs, billets or scrap iron, there's a STEARNS Lifting Magnet EXPERIENCE ENGINEERED to help you save time and money. For the efficient handling of flat steel sheets, plates and bars, be sure to investigate STEARNS Rectangular Lifting Magnets.

STEARNS Lifting Magnets are available in standard sizes in both bolted and all welded constructions. Special sizes and shapes made to meet your requirements.

Write today for complete specifications and operating data.

Foremost in the Magnetic Field

Stearns MAGNETIC INC.

662 S. 28th St., Milwaukee 46, Wis.

sand which requires no doctoring.

Take another experience which is common to those seeking to control a synthetic sand. If such a sand is completely bonded with western bentonite, it may be found that the edges of the mold crumble even though the green strength appears high enough. Adding a fine bank or molding sand can overcome this but the spread of grain sizes may be too great to give proper ventability. Frequently, the use of a combination of clays will overcome this difficulty. Having the clay-bentonite content in proper ratio widens the tempering range to practical limits. A sand with a narrow tempering range invites a number of defects such as pinholes if the moisture is too high or dirt wash if it is too low. A sand which cannot stand a variation of more than .3 per cent from the desired moisture content presents problems in most foundries.

On the other hand, when a foundry is using a molding sand which gets most of its green strength from fines and silt, it may find that it has to carry its moisture very low to avoid scabs or cuts in front of the gate. Usually, the trouble is a low value in true clay, and in this case the addition of bentonite is helpful in reducing defects as well as widening the tempering range to a more practical figure.

Mulling—The experience with slurries brings out quite forcibly the pitfalls of under mulling. Fig. 8 sets forth the strength and permeability variations with mulling time in three different foundries using these different types of equipment: A used the high speed type muller. B used the standard muller with two revolving muller wheels. C used the revolving pan type muller.

Permeability factors became fairly stable after the third minute in A and the sixth minute in B and C, but in all cases the green strength kept rising past the point where economical mulling could be carried.

These data are not presented with a view to comparing three types of mullers but to illustrate the need for standard mulling procedure. Just because a foundry has a muller is no reason to assume that it is getting good mulling. The chances are rather good that they are not. How many foundries have a mechanic service a muller unless it breaks down? How many have a set procedure in adding materials? How many have a set mulling time?

Running a mulling test on any muller reveals quite clearly when some mechanical feature is wrong and serves as a base for setting up a mulling procedure.

As might be expected, incorporations of clays in the form of slurries as a thixotropic gel will bring a sand up to its full properties much quicker. Consider the case of two different mixtures of a system sand, identical in composition, and mixed in the same muller.

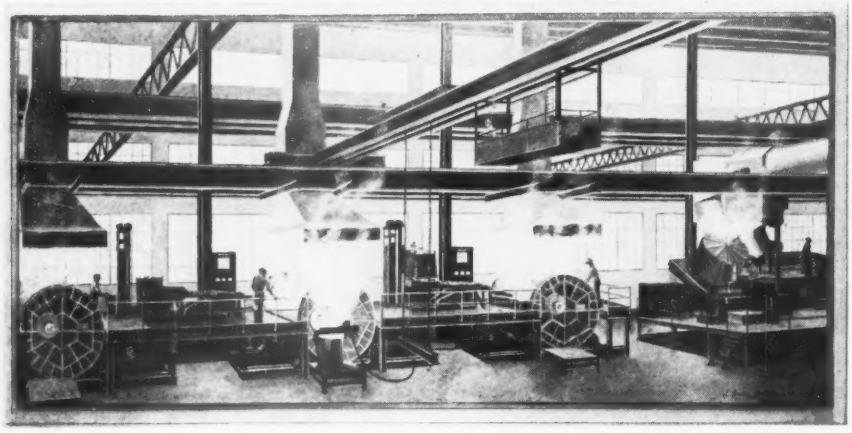
	D-dry	S-slurry
Heap sand	43 gal.	43 gal.
No. 70 silica	7	7
Corn flour	1/8	1/8
Seacoal	2	2
Bonding clay	3/4	3/4 *
W. Bentonite	1/4	1/4 *
Water	2 1/2	2 1/2 *

* Slurry

The permeability at all stages of the mulling from three minutes on was just about the same (30-33), but the rate at which the green strength increased was much different, as will be shown in Fig. 9. The strength at the end of the three-minute mull in the slurry mixture was equal to the strength after seven to eight minutes where all ingredients were added dry.

(*Concluded on page 226*)

AJAX INDUCTION MELTING FURNACES A NEW TOOL FOR INDUSTRY



This oil painting, 9 feet long in full color, by J. Gordon White, shows AJAX-SCOMET installation at Scovill Manufacturing Co., Waterbury, Conn.

Here is a new tool for melting metal . . . Something that can concentrate enormous power in a small space . . . Something that can be adapted to accurate pouring, to precise temperature control, to inert gas protection, to high grade refractories... A tool that can be used for all existing non-ferrous metals and alloys.

Ajax furnaces paved the way for continuous casting processes which lay dormant in old patents of far-sighted inventors who thought ahead of their times. *Write us for further information.*

AJAX TAMA-WYATT

AJAX ENGINEERING CORP., TRENTON 7, N. J.

INDUCTION MELTING FURNACE

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax Westinghouse High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax Holtgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax Wyatt Induction Furnaces for Melting

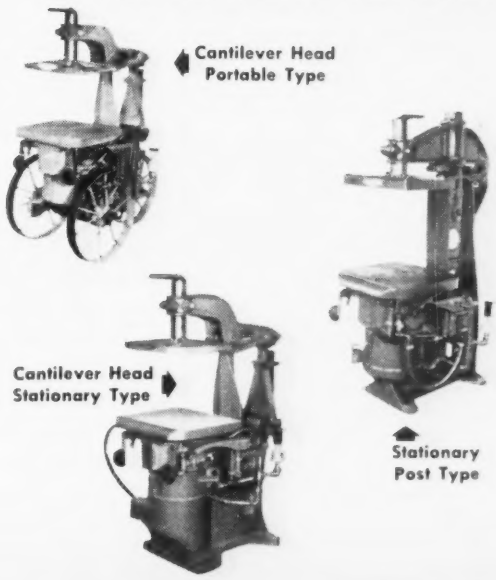
OSBORN JOLT SQUEEZERS

- Wide Range of Table Sizes
- Squeeze Pistons 10" to 18" Diameters
- Cantilever or Post Type Heads
- Portable or Stationary

BUILT FOR LONG LIFE, ECONOMICAL PRODUCTION

Osborn Squeezers are built from only the finest materials and assembled with machine-tool precision. Accuracy, economy, and ease of operation have made Osborn Jolt Squeezers the production standard of the foundry industry. Closing Bench, Riddle Racks, Vibrator, Blow Gun and Automatic Squeeze Pressure Release Valves are furnished as standard equipment on Osborn Squeezers.

PRODUCTION STANDARDS OF THE FOUNDRY INDUSTRY



OSBORN®

MOLDING MACHINES CORE BLOWING MACHINES INDUSTRIAL BRUSHES

THE OSBORN MANUFACTURING COMPANY

5401 Hamilton Avenue Cleveland 14, Ohio

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

MORE PRODUCTION from each PRODUCTION DOLLAR

An immediate way to realize more production per manhour—and at minimum investment—is by the installation of CM Electric Hoists. By making use of non-productive overhead space you can speed the flow of parts and assemblies... raise employee efficiency levels... reduce fatigue. As anyone can operate these CM Electric Hoists, skilled manpower is released for other production operations. Valuable floor space is made free for added production. Here are two CM electric hoists favored particularly by plant production executives.

CM METEOR Capacities: ½ to 5 tons

Low headroom wire rope electric hoist for heavy duty service. Single and two speed models. Push button control. High efficiency airplane type cooling. Helical gears. Fully enclosed operating parts. Precision bearings at all rotating points. Plain, geared or motor driven trolleys.

CM COMET Capacities: ⅛ to 2 tons

Portable, compact and rugged electric chain hoist. Available in push button and pendant rope control models. Equipped with flexible HERC-ALLOY load chain. Fully enclosed working parts. Upper and lower safety limits. Permanently lubricated. Plug in on 110, 220 or 440 volt power line. Used extensively in production operations.

● **CM Electric Hoist Catalog** sent on request with prices and name of your local CM distributor. Production executives find our catalog a good source of hoist information.

CHISHOLM-MOORE HOIST CORPORATION

(Affiliated with Columbus McKinnon Chain Corporation)

GENERAL OFFICES AND FACTORIES: TONAWANDA, N. Y.

SALES OFFICES: New York, Chicago and Cleveland • Distributors Everywhere

(*Concluded from page* 224)

After eight minutes the strength of the slurry sand leveled off to a maximum, while the other sand showed no indication of doing this after ten minutes.

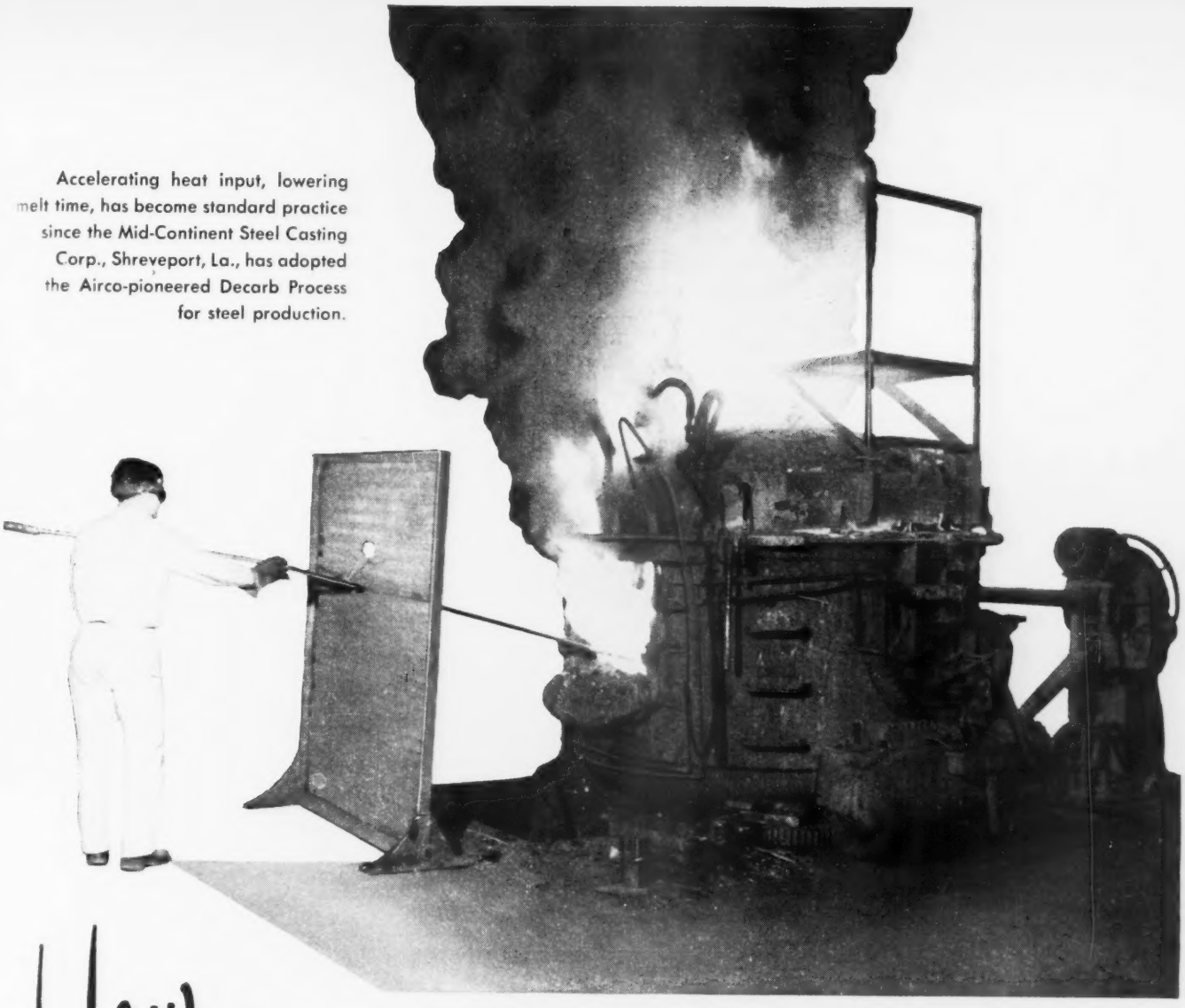
In a natural bonded molding sand nature has done a fairly efficient job of coating each individual grain. In a synthetic sand, starting with a clean silica grain, one does not start with such an advantage; mulling then becomes more vital. In this particular test the bond in the heap sand was already uniformly distributed so that the slurry had an opportunity to be most effective with just a few minutes mulling. For foundries considering this form of bond addition, best results will come from setting up the mixing equipment so it can be carried out from day to day on a continuing basis.

It may be stated that the most important items in the control of a foundry sand are uniformity in base screen analysis, having the clay in a proper condition so that the water is in thixotropic combination, and, having this gel uniformly distributed over the grains. In a synthetic sand these produce the conditions where the sand is best able to show good flowability characteristics and resist the heat impact of the molten metal. Other ingredients are important, but it would be well to consider them as additive compounds which supplement the basic properties of the molding sand.

Need Daily Sand Tests

Once the basic properties of a molding sand are established, the daily sand tests are designed to keep the system in control. But what good is a sand test if the sand that is tested is improperly mulled? If a facing mixture is changed because green strength does not come within specified limits, under conditions where the clay bond is not adequately distributed, then trouble may be built up for the future. How many cases come up where a sand will show buckles, scabs or some other tendency attributable to sand when the conventional sand tests show maintenance specifications? If mulling is not investigated first, control is likely to degenerate into a sort of guesswork procedure.

Under such conditions one may anticipate that either the wrong guess is made and the condition becomes worse, or some sort of additive is hit upon which appears to mitigate the trouble. If such an additive is not absolutely necessary, the sand mixture is likely to become more complicated and control more difficult.



Accelerating heat input, lowering melt time, has become standard practice since the Mid-Continent Steel Casting Corp., Shreveport, La., has adopted the Airco-pioneered Decarb Process for steel production.

How TO INCREASE STEEL PRODUCTION

use less power–save more time

WITH AIRCO'S STEEL DECARBURIZATION PROCESS

Oxygen injected under the slag cover at 80 psi has become the answer to Mid-Continent's faster steel production.

Increased bath temperature—faster carbon elimination—lower power consumption . . . time saved per heat . . . gives Mid-Continent a product with the same normal chemistry, slag control and fluidity as they formerly received using ore. Additional workflow advantages are gained by the elimination of ore handling and storage problems.

Oxygen decarburization for faster heats may be put to work for you. The facilities of our Technical Sales Division may furnish you with the answers you need to know about this process for your use. If you are interested in obtaining further information, please address your nearest Airco office.

AT THE FRONTIERS OF PROGRESS YOU'LL FIND

AN AIR REDUCTION PRODUCT

AIRCO®

DEALERS AND OFFICES IN PRINCIPAL CITIES

AIR REDUCTION

AIR REDUCTION SALES COMPANY • AIR REDUCTION MAGNOLIA COMPANY • AIR REDUCTION PACIFIC COMPANY

REPRESENTED INTERNATIONALLY BY AIRCO COMPANY INTERNATIONAL

DIVISIONS OF AIR REDUCTION COMPANY, INCORPORATED

Refractory Molds

(*Continued from page* 103)

poured. If the refractory wash has been correctly applied no difficulty should be encountered in the separation of the mold parts or in extracting the original sample casting. Mold part location may be obtained by drilling and dowelling, or provision can be made in the casting operation by male and female pieces integral with the appropriate mold faces.

Difficulty is sometimes encountered in the manufacture of pressure-tight sand castings. An increased cooling rate is usually effective in such cases, but metallic molds of orthodox design are not always economic. Durable molds for small castings have been made experimentally from aluminium bronze shot bonded with bentonite. These molds are not permanent in the accepted sense but can be very useful.

Many foundries have adopted investment casting techniques for small components which are too costly or too difficult to produce by machining. Sillimanite mold material bonded with ethyl silicate is widely used for this purpose. Alternative mold materials such as cristobalite and alumina and various silicate and phosphate bonding agents, have been used, but for most purposes, and particularly high temperature work, ethyl silicate is most effective. A logical extension of this work has been the development of sillimanite permanent molds. These are made from orthodox pattern equipment and if difficulty is encountered in casting ejection, a simple ejection machine of the type illustrated is quite effective.

Excellent molds can be made from electrode graphite, and normal woodworking tools are suitable for machining this material. This high thermal conductivity of electrode graphite is a valuable feature, but this mold material is not wetted by molten metals and sharp-edged castings are not readily obtained under normal conditions. Moreover, graphite tends to oxidize at temperatures in excess of 750°F and this characteristic can restrict rapid production.

Prevent Oxidation

The writer has established that oxidation can be prevented if the graphite mold faces are treated with ethyl silicate solution, and then stoved at 300°F to precipitate silica in the pores. A barrier layer is thereby established, and if the treatment is repeated a silica-impregnated mold face is obtained which is quite resistant to oxidation and reduces the undesirable surface tension effects observed in ordinary graphite molds. The latter can be completely neutralized if the mold assembly is vibrated during pouring and solidification. Typical graphite molds are shown in the accompanying illustrations.

Refractory materials which can be poured in a similar fashion to plaster are very attractive to foundrymen, since mold details can thereby be faithfully reproduced. British Patent 575,693 indicates that carbon gels can be obtained if furfuraldehyde is treated with mineral acids. The mixed liquids are maintained in a liquid-tight container which incorporates the necessary pattern equipment until a rigid carbon form is produced. Plastic molding materials which can be shaped in a similar fashion to molding sand, which can be handled after stoving like an oil sand core, and developing normal refractory properties after suitable firing treatment, are ideal in many respects for normal foundry practice. If such materials are of appreciable thermal conductivity, additional advantages

(*Concluded on page* 232)

Products known for good Performance

in Foundries Everywhere

Available from Leading Foundry Suppliers in the U. S. and Canada

AMERICAN COLLOID COMPANY

MERCHANDISE MART PLAZA • CHICAGO 54, ILLINOIS

The hard, cold facts about Pittsburgh's hot furnaces!

47 PLANTS OKAY THE HEAT PROVER

Pittsburgh's great steel industry needed an instrument to measure air infiltration, to check air requirement and fuel-air ratio controls in open-hearth furnaces . . . an instrument to check the stoves in which blast-furnace air is heated . . . to check precise atmospheres in soaking pits . . . to control fuel waste and precise atmospheres in processing furnaces.

THE CITIES SERVICE HEAT PROVER WAS THE ANSWER . . . and it received the stamp of approval from engineers in 47 different mills in and around Pittsburgh!

Cities Service Heat Provers . . . *not an instrument you buy, but a service we supply* . . . helped to boost furnace productivity through these five unique advantages:

1. Rapid continuous sampling.

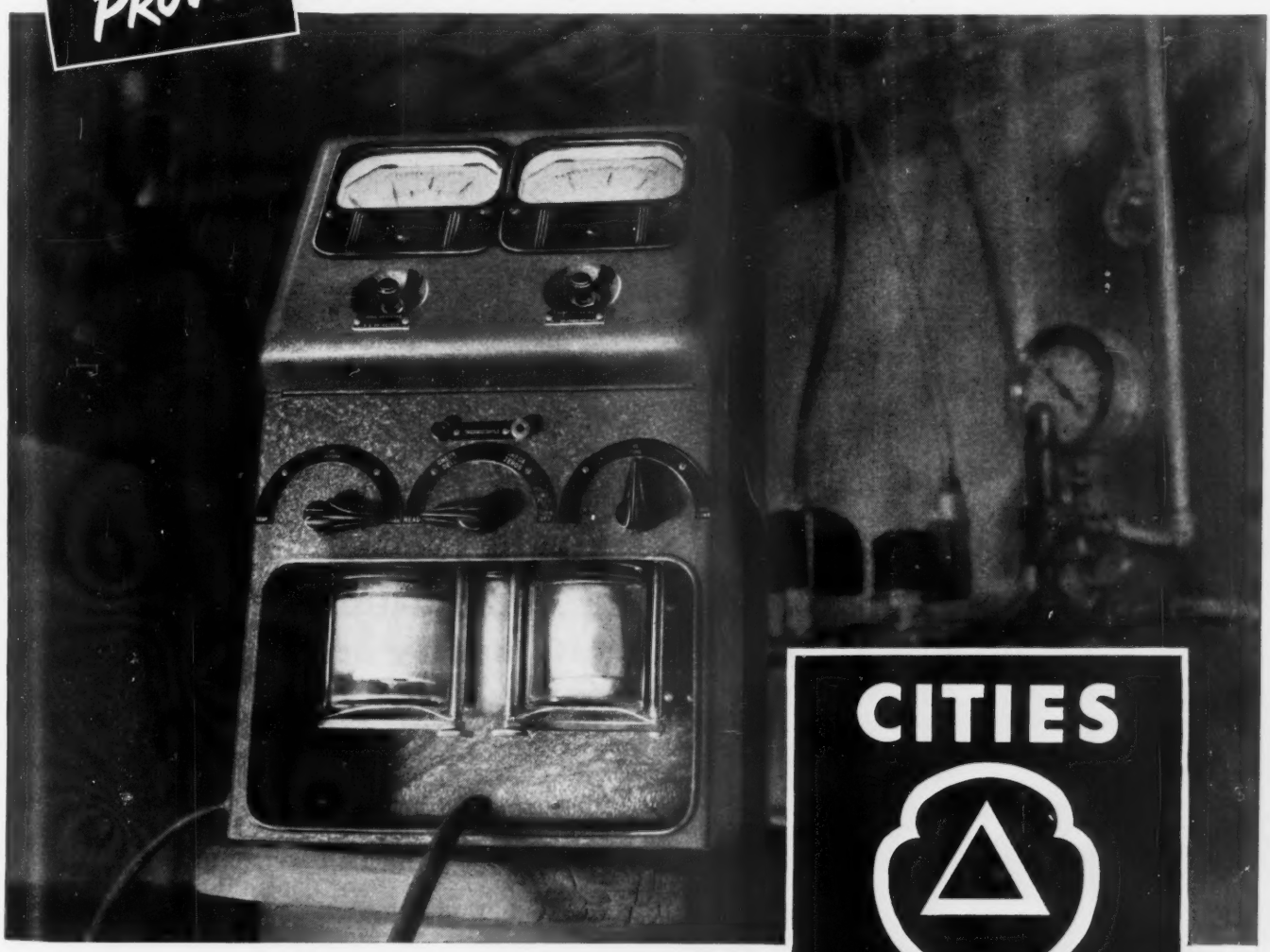
2. Simultaneous reading of oxygen and combustibles.

3. Direct measurement of oxygen and combustibles.

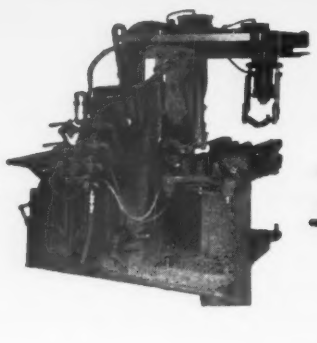
4. Easy portability.

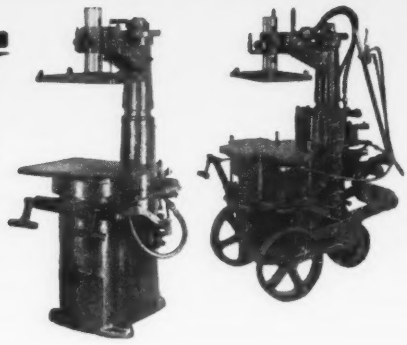
5. No maintenance; no re-calibration.

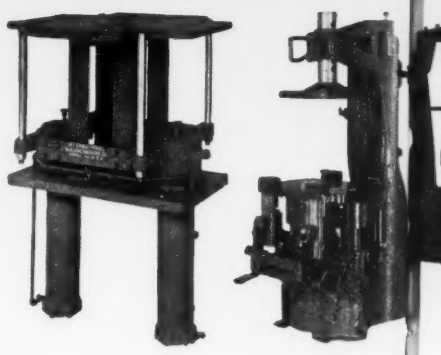
These points begin to tell you why Cities Service Heat Prover analyses are just as much favored in glass, ceramics, steam generation and other fields as in the great Pittsburgh steel area. For the full story as it applies to you, write CITIES SERVICE OIL COMPANY, Dept. H41, Sixty Wall Tower, New York City 5.

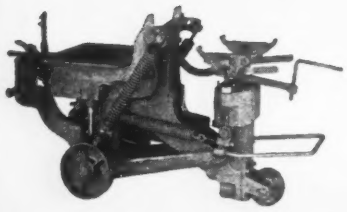


CITIES SERVICE



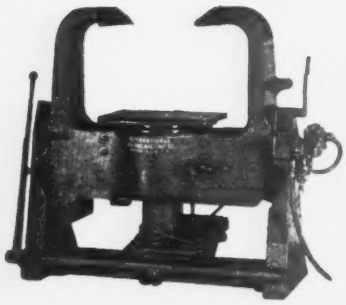


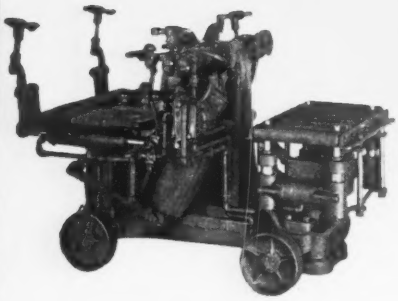




INTERNATIONAL MOLDING MACHINES

For Castings



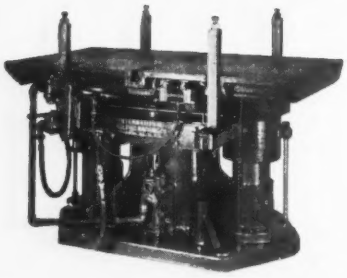


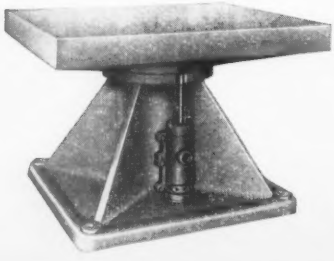
Foundries in which MAXIMUM PRODUCTIONS are maintained continuously are equipped with

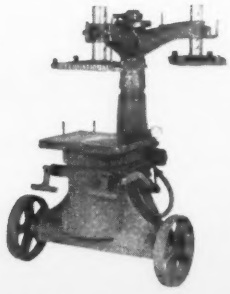
INTERNATIONALS

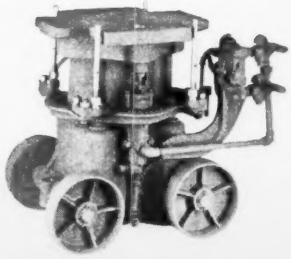
70 Standard Types - - - 900 Different Sizes

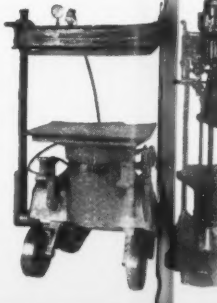
Many Special Designs to meet Special Requirements

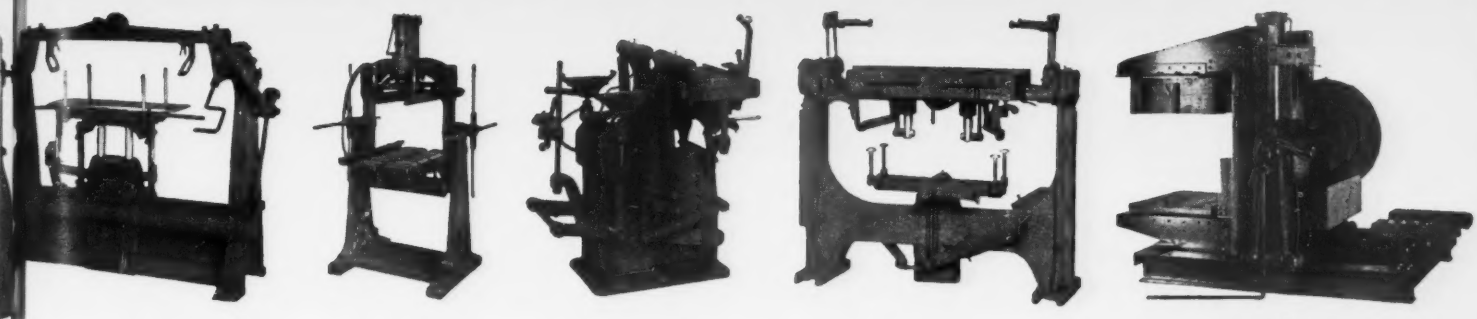






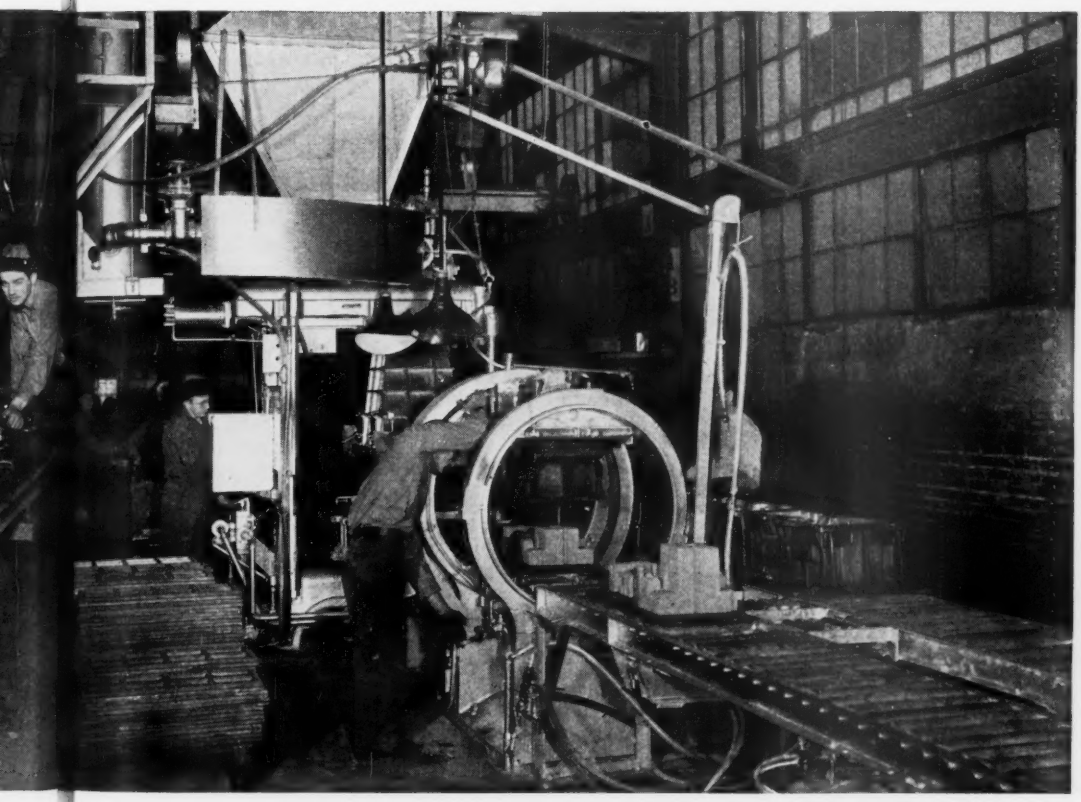


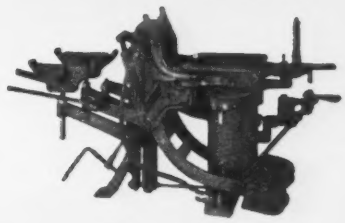


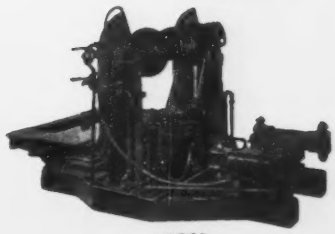


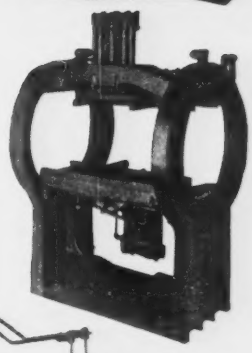
INTERNATIONAL MOLDING MACHINES

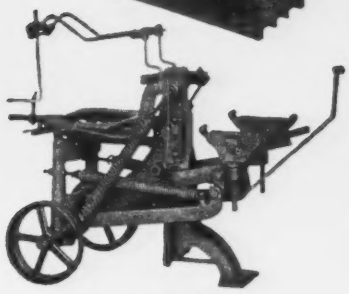
For Cores

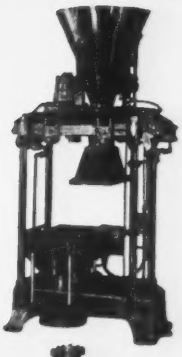




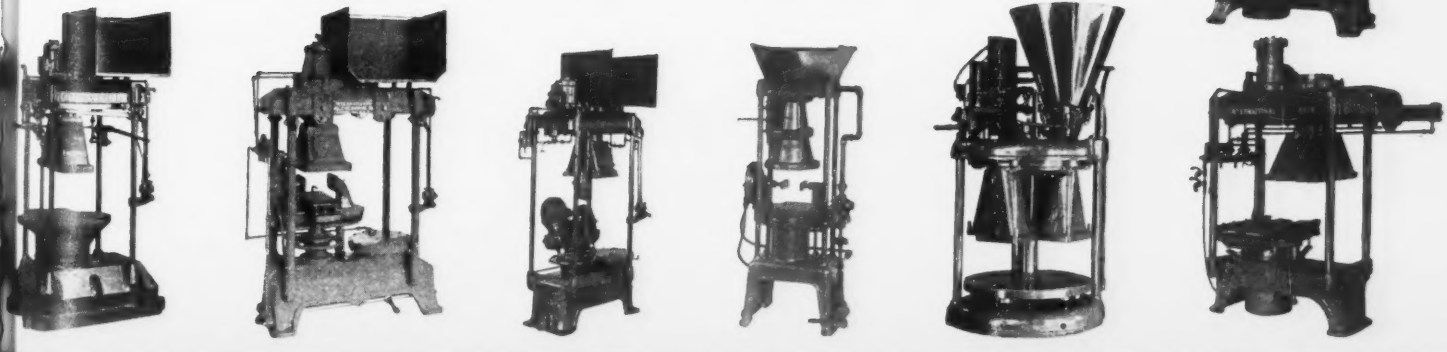








INTERNATIONAL
MOLDING MACHINE CO.
LA GRANGE PARK, ILLINOIS



(*Concluded from page 228*)
will be apparent.

The Lind mold, covered by British Patent 663,647, combines the best features generally thought desirable in permanent molds. Granular silicon carbide of appropriate grain sizes is bonded with bentonite rendered plastic by means of an aqueous solution of sodium carbonate. The mold material is mixed in a normal pan mill to coat the grains completely, and can then be regarded as a synthetic molding sand. Molds may be made on ordinary snap flask principles, and subsequently dried. The dried molds are then baked at approximately 1500° F, and the bonding agent thereby converted to a stable form.

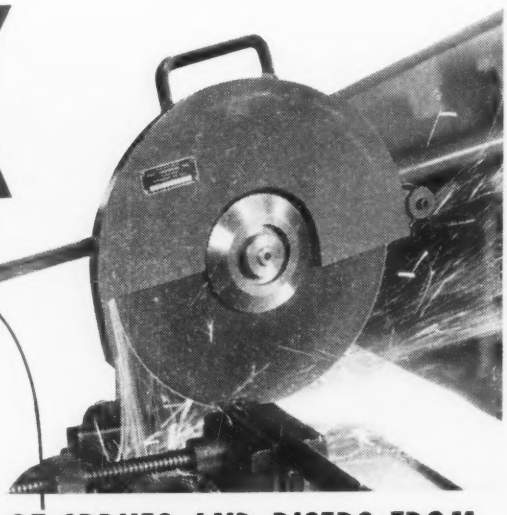
Reaction between the acidic granular refractory and the basic bentonite is facilitated by the sodium carbonate present. Molds produced in this way are quite rigid and have a thermal conductivity value almost ten times greater than that obtained from ordinary sand molds. If additional chilling capacity or wear resistance is thought to be desirable metallic inserts of appropriate size and shape can be rammed up in the original mold parts.

FOX

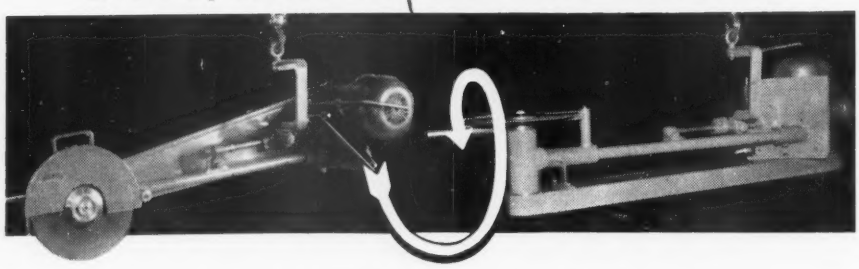
SWING FRAME

CUT-OFF

MACHINE



FOR FAST REMOVAL OF SPRUES AND RISERS FROM BRONZE, ALUMINUM AND IRON CASTINGS!



FULL MANEUVERABILITY THROUGH 180°

The new Fox Swing Frame Cut-Off Machines have been designed to take advantage of the new type "flexible" cut-off wheels. The machine has full maneuverability through 180°. It is especially recommended for the removal of sprues and risers from bronze, aluminum and iron castings.

Available in two sizes, 16" and 20". Write for Catalog!

FOX GRINDERS, Inc.

OLIVER BUILDING PITTSBURGH 22, PA.

1952 Redesign Contest Announced by GIFS

Gray Iron Founders' Society, 210 National City—East Sixth Bldg., Cleveland 14, has announced opening of its 1952 redesign contest. Open to anyone in the metals working field, the contest is intended to encourage wider use of gray iron by recognizing designers and others who have used gray iron successfully as an alternate for other materials.

Cash awards totaling $500 will be divided among the winners at the society's annual meeting at Cleveland in October. Contest judges are the society's advertising committee: E. H. Thompson, H. P. Deuscher Co., Hamilton, O., chairman; C. W. Bonbright, General Foundry & Mfg. Co., Flint, Mich.; E. J. Bothwell, International Nickel Co., New York; W. A. Kramer, Advance Foundry Co., Dayton, O., and L. F. Williams, Cooper-Bessemer Corp., Mt. Vernon, O.

Survey of Manufactures

First annual volume of manufacturing statistics, "Annual Survey of Manufacturers, 1949 and 1950," has been published by the Bureau of the Census. Designed to provide basic industrial statistics for the years between full-scale censuses of manufacturers taken every 5 years, the volume presents statistics on wages and salaries, man-hours, value added by manufacture, cost of materials, value of shipments for selected industries and classes of products, size of establishments, manufacturers inventories, plant and equipment expenditures and selected metals consumed. Next census of manufactures will be taken in 1954, covering industrial activity in 1953, and most recent one covers 1947. Volume, priced at $2, will be on sale through Government Printing Office and field offices of U. S. Department of Commerce.

German Foundry Meeting

Annual meeting of the Verein Deutscher Giessereifachleute (Association of German Foundrymen) will be held Sept. 25-27, in Duesseldorf, Germany, at Robert Schumann hall. First and last days will be devoted to plant visitations, supplemented by meetings. Second day will be devoted to meetings, lectures, papers, discussions etc.

small fry . . .

Compared to a lot of its competitors, Metal Blast is small. But we're growing! Already we're the largest independent producer of shot and grit. And it's just because we're making mighty good abrasives—economically, in automatic furnaces (our own design)—selling them at reasonable prices—and guaranteeing them 100%. We'd sure welcome a trial order from you on this basis. Contact your local Metal Blast representative or write us direct.

FULLY GUARANTEED

If you don't find Super-Annealshot and Grit the best and most economical malleable abrasives you've ever used—return the un-used quantity for refund, at our expense.

Swim suit by Jantzen

SUPER-ANNEALSHOT
ANNEALSHOT
products of
METAL BLAST
INCORPORATED

872 EAST 67TH STREET CLEVELAND 3, OHIO

New EQUIPMENT and Supplies

For Additional Information on these Items Use Reply Card—Page 237

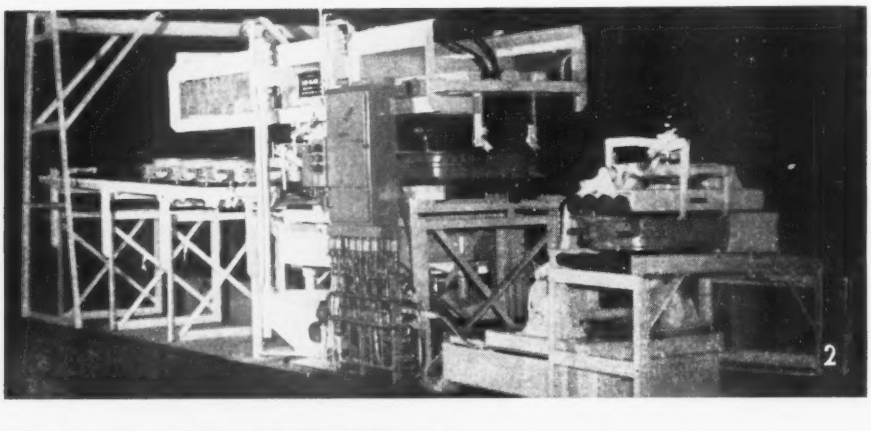
(1)—Space Heater: Bica Co., 1170 North State St., Girard, O.—Portable space heater burns propane gas and has an output of from 85,000 to 150,000 btu per hr. Heater operates from 40 to 63 hr on a 100-lb tank of gas, and is said to cost an average of 11 to 17 cents per hr to operate. Unit is 31 in. high, 20 in. square at base and 17 in. diam at top. It weighs 31 lb. One model comes with a 7-ft hose and a manual control for operation. A second model has extra equipment including a valve control, thermocouple, and pilot light to adapt it for continuous unattended indoor operation.

For More Details Circle No. 1—Page 237

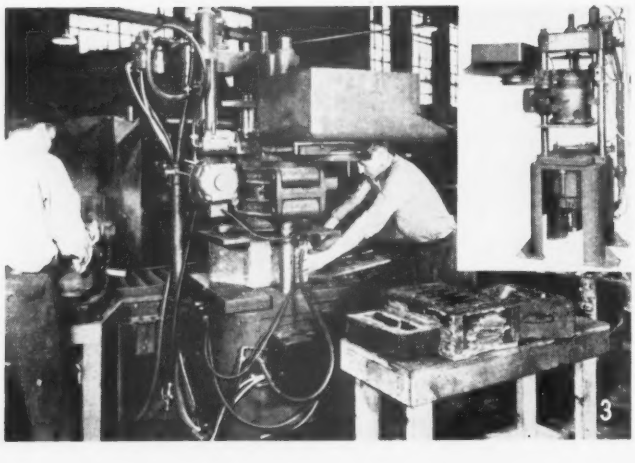
1

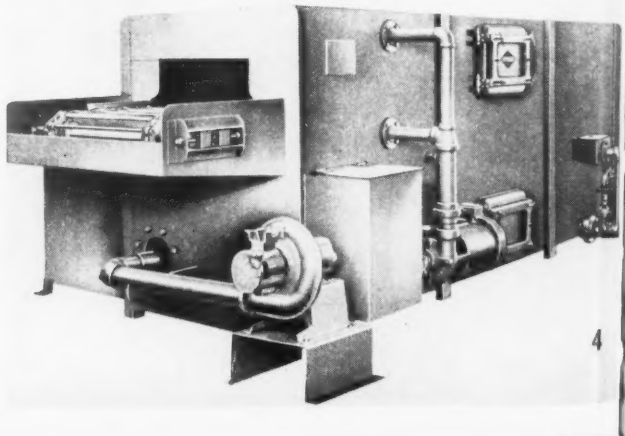
(2)—Molding Machine: Wm. H. Nicholls Co., Richmond Hill 18, Long Island, N. Y.—Push-button molding machine is designed to produce a half mold every 15 seconds. Flasks move through the machine on rollers. Cycle of operation is started when machine lowers an upset onto the flask and hopper gates open, discharging a predetermined quantity of sand into the flask. At this point the machine starts jolting and continues for a predetermined time. The upset then raises and the sand gates close. The mold is struck off as the squeeze head moves into position. After the mold is squeezed the pattern is drawn on the down or return stroke of the squeeze piston. As the squeeze head rolls to the out position it pulls the mold onto the roll-out extension, and the machine is ready for the next empty flask. In the case of drag molds the squeeze car moves the mold from the roll-out extension to turnover rollers, clamps the mold into position and turns it over. After turnover the mold is lowered again to the roller conveyor and the clamps released. The turn-over returns to receiving position. As the next half mold comes through the machine the completed half mold is pushed out on a gravity roller conveyor. Machine will handle flasks up to 40 in. long (inside measurement). Other specifications are: Squeeze piston diameter 21 in.; draw 8 in.; jolt piston diameter 9 in., and jolt capacity at 80 psi 1600 lb.

For More Details Circle No. 2—Page 237


2

(3)—Core Blower: Federal Foundry Supply Co., 4601 East 71st St., Cleveland 5—Core blowing ma-


3


4

chine is designed to be able to blow cores in unvented, unrigged wooden coreboxes. The machine blows cores with two, three or four short, quick blows. Air pressure within the corebox is kept low during the blowing cycle. Consequently, metal or reinforced wooden boxes are not required. It is said that the same coreboxes used by hand coremakers can be used. Air valves and switches automatically control the blowing cycle, starting and stopping blowing action to maintain pressure within the core box close to atmospheric pressure at all times. Machine features a mechanized sand magazine, using motor-driven plows and an aerating air circuit to move sand to the blow hole and carry it into the corebox. Any core sand mixture that can be hand rammed, with moisture content up to 8 per cent and green bond strength up to 12 psi, can be blown, it is claimed. Cores weighing from a few ounces to 40 lb can be blown with one standard sand magazine.

For More Details Circle No. 3—Page 237

(4)—Washing Machine: Alvey-Ferguson Co., Cincinnati 9—Washing machine is engineered for removing sand mechanically from steel foundry flasks. The flasks pass along on a bar type conveyor through consecutive high-pressure, fan-shaped curtains of cleaning solution from above, below and both sides until the flask is free of sand. Cleaning solution, in recirculating through the machine, flows very slowly through a supply tank. Consequently, sand settles out of the solution before it reaches the screen tank, which screens out foreign particles that might clog the spray nozzles.

For More Details Circle No. 4—Page 237

Safety Helmets: Industrial Products Co., 2827 North Fourth St., Philadelphia 33 — Fiberglas safety helmets and caps for protection against falling material are designed for varying head shapes, allowing adequate space between the head and the crown. This provides a time interval for the head to "roll with the blow" when helmet is struck. Helmet weighs 12 oz, the cap, 10 oz. Units are weatherproof and offer protection against flash flame. They have a replaceable leather sweatband adjustable to head sizes from 6½ to 8. Helmets and caps come in brown, white, red, green and yellow.

For More Details Circle No. 5—Page 237

Sand Additive: Eastern Clay Products Dept. of International Minerals & Chemical Corp., 20 North Wacker Dr., Chicago 6—Additive for molding and core sand has been developed to promote fine finish, minimum defects, and faster cleaning of castings. The material, known as Triplact, is said to increase sand flowability and workability and to ram better on vertical surfaces and deep pockets. It is also said to provide the reducing atmosphere needed to stop burn-in and penetration, and to control expansion and collapsibility. Molding sand containing the material becomes an all-purpose sand, suitable for green sand castings ranging from less than 1 lb to over 5 tons. When used in core mixes it is claimed to give smooth surfaces, minimum veining, and quick collapse.

For More Details Circle No. 6—Page 237

Fans: Harvey P. Bertram Co., Dept. 4, Ninth & Freeman Sts., Cincinnati 3—Tubeaxial and Vaneaxial fans are designed for use in ventilating systems where a high pressure air flow and large capacity is needed. Tubeaxial fans are designed for system ventilation, and may be connected to an inlet or outlet duct, or both. Vaneaxial fans have guide vanes to straighten out the air stream, giving a true axial flow and increasing mechanical efficiency by converting waste energy into useful work. Both fans are available to customer job needs and specifications, in either direct or belt driven units, in sizes from 12 to 48 in., motors from ⅛ to 50 hp, static pressure to 4 in., and 1000 to 65,000 cfm.

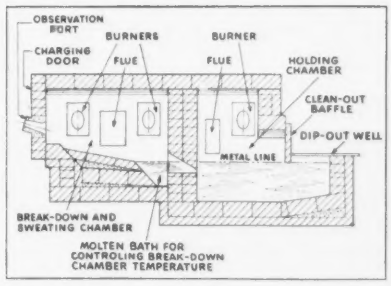
For More Details Circle No. 7—Page 237

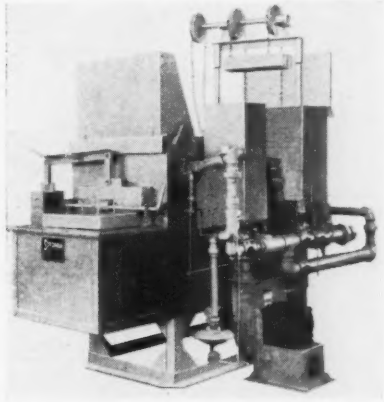
Lenses: American Optical Co., Southbridge, Mass. — New plastic safety lenses have been shown by tests to be highly resistant to such eye hazards as splashing chemicals, welding spatter, emery wheel sparks, and the impact of hard, small, high-velocity particles, as well as lens fogging caused by steamy work conditions. The lenses are made by combining certain chemicals with a thermosetting liquid plastic which solidifies under heat and has good scratch resistance. The mixture is placed in precisely curved glass molds and baked under a controlled heating and time cycle.

For More Details Circle No. 8—Page 237

Core Oil: Swan-Finch Oil Corp., 205 East 42nd St., New York 17—Fast-baking core oil is said to provide a minimum baking time and to have a wide safe baking range without danger of overbake at higher temperatures. Additional claims are that collapsibility of cores produced

Double Chamber Aluminum Melting Furnace





NEW furnace for melting and holding aluminum is composed of two separate chambers. In the melting chamber the ingots or returns are covered completely by flame as they are fed into the charging door and all capillary moisture is driven out before the metal melts and runs into the holding chamber. Metal usually flows into the holding chamber at between 1160 and 1180° F. Cold or moist metal never reaches the molten bath, thus reducing the possibility of gas pick-up from capillary moisture. Each chamber is heated separately, and temperature is controlled automatically. Metal in the holding chamber can be controlled to within ±10° F, reducing the possibility of overheating. Other features of the furnace are: It eliminates hard spots in the bath; the holding chamber develops a dry, fluffy dross, and the bath can be held at temperature for several days without ill effect. Furnace is fired with oil, gas or combination gas-oil burners. Capacities range from a molten bath of 700 lb up. The unit was developed by Stroman Furnace & Engineering Co., division of Petersen Oven Co., 9900 Franklin Ave., Franklin Park, Ill.

For More Details Circle No. 9—Page 237

All sizes graded to S.A.E. specifications

"Certified" Abrasives

clean more castings per dollar!

"Certified" Samson Shot and Angular Grit are made *extra-tough* by a special *automatically controlled* hardening process. They wear longer, can be used over and over again . . . actually clean more castings per dollar! Save money . . . switch to "Certified" Abrasives.

Experienced Foundrymen say:

Always specify "Certified"

ACCEPTED AND USED FOR OVER 55 YEARS

PITTSBURGH CRUSHED STEEL CO., Pittsburgh, Pa.

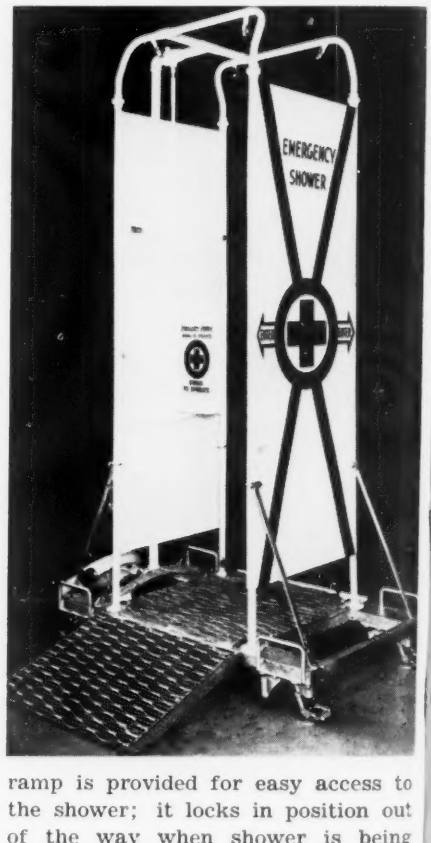
STEEL SHOT AND GRIT CO., Boston, Mass.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA

is good, very little irritating gas and smoke is generated, the oil works clean in core boxes and blowers, and produces strong, hard cores.

For More Details Circle No. 10—Page 237

Emergency Shower: Logan Emergency Showers Inc., Glendale, Calif.—Mobile emergency shower to meet the risks and hazards of fire, acids, radiological, bacteriological, and other contaminants to the human body, may be installed anywhere. Instantaneous wetting and washing of all parts of the body and clothing of persons exposed has been found effective in reducing serious injuries. Mobility is achieved by easy rolling casters, and the unit is held fixed in position by adjustable truck stops. A

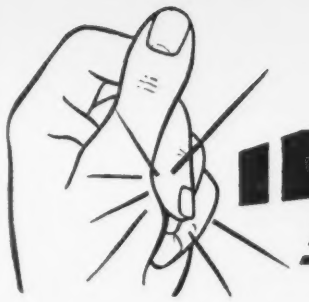


ramp is provided for easy access to the shower; it locks in position out of the way when shower is being moved. The unit incorporates four overhead, two special sprays for eyes and face, and four bottom sprays that direct water upward under smocks, coats, etc. In addition, four streams are directed to the feet. Valve for turning on water is operated by swinging gate that is activated by slightest pressure. Valve remains open until manually closed.

For More Details Circle No. 11—Page 237

Contact Wheels: Behr-Manning Corp., Division of Norton Co., Troy, N. Y.—Company has been instrumental in the development of a new design in abrasive belt contact wheels. The wheels consist of a steel

(*Continued on page* 239)



IDEAS FOR FOUNDRYMEN

AVAILABLE FOR THE ASKING—This reader-service is designed to provide foundrymen with "idea" and reference material. Listings are selected from company product literature and reprints of special FOUNDRY editorial articles.

50. Gripe Eliminating Gripper

Joy Mfg. Co.—You'll have happy workmen in your cleaning rooms when Joy pneumatic casting grip is used. This floor mounted device really holds irregularly shaped, medium size castings. It abolishes one of the hazards of snagging and cleaning.

51. Sand Reclamation

Denver Equipment Co.—Any foundry whose new sand costs in excess of $2.00 per ton should consider reclamation with equipment and process outlined on two-page illustrated and data-packed bulletin No. M7-F8. Problems and solutions are covered. Just two pages, but valuable.

52. Dust Collectors

Claude B. Schneible Co.—One could go into great detail on the Multi-Wash dust collectors and dewatering tank and pumps made by this company, but 20-page illustrated bulletin No. 510 does the job much better. All the details and installation photos are included. Better get it!

53. Phenolic Resins

Bakelite Co.—Advantages of the Croning process to castings users and to the foundry are detailed in 20-page illustrated brochure K-8 on Phenolic resins for foundry molds and cores. Fundamentals are extremely well explained in word and pictures.

54. Twin Crucible Furnace

Morrison Industries, Inc.—If you send for 4-page illustrated bulletin No. C-101, you will read how Markley recuperative twin crucible furnaces are fired on one side and use waste gases to heat the other side. They are used for melting many nonferrous alloys. Long live the linings and crucibles with this system!

55. For Your Pattern Shop

Wellman Products Co.—154-page illustrated catalog S-51 is arranged alphabetically and thoroughly indexed for ease of use in selecting and buying general pattern shop supplies and equipment ranging from abrasives and alcohol to wood fillet and zinc tape. Descriptions, prices and other data are given on everything needed in the pattern shop. Tools, machines, supplies, core and pattern fittings, finishes and coatings, pattern letters, and hundreds of other products are covered. If you have a pattern shop, you'll need this handbook.

56. Sand Conditioners, Shakeouts

Case Studies 1 and 2 are subject of 4-page bulletin 507, published by National Engineering Co. It details how small foundries profit with Simpson Utility sand conditioning equipment. Equipment also handles shakeout operations in cleaning room.

57. Gas Burners

Eclipse Fuel Engineering Co. — Here's two fact-packed bulletins, Nos. H-61 and H-62, that give specs and application data on piloted gas burners for furnaces, ovens and process equipment requiring temperatures from 200 to 2400° F.

58. Liquid Transfer Pump

Wilkinson Equipment & Supply Corp.—You get high capacity liquid transfer with the High Speed pump, capable of delivering 18 gpm of No. 20 lubricating oil when operating on 150 psi. Read about it in 6-page pocket-size folder.

59. Foundry Ceramics

American Lava Corp. — "Foundry Ceramics that Withstand Heat Shock" is title of AlSiMag bulletin No. 522. It describes, illustrates and gives specs for strainer cores, gate tubes, troughs and cut-off cores. Mark this one.

60. Pneumatic Oil Torch

E. Schneider Co.—Instructions on use of the German-made Perplex pneumatic oil torch and Original pneumatic blacking apparatus plus description of the Magnet pneumatic mold cleaner are contained in two data sheets. Himmel! Vy not zend for it?

61. Expendable Core Boxes

Industrial Pattern Works—What do users say about Duplicast expendable core boxes? Send for 4-page descriptive folder and find out. It presents advantages, features and savings possible with use of these core boxes.

Additional Information?

For additional information on any of the items described under "New Equipment and Supplies," "Trade Publications" or "Ideas for Foundrymen" in this issue—simply circle corresponding item numbers on one of these cards

62. Leather Fillet

Milwaukee Leather Belting Co.—It may be brief, but 4-page pocket-size folder points out the advantage of Craft leather fillet. Prices are also tabulated on this pliable, fine feather edge fillet.

63. Speedy Handling

George Haiss Mfg. Co.—Drag type conveyors and car unloaders will handle coal, coke, sand and other materials with minimum of effort. Details of machines with capacities up to 120 tons per hour are given in 4-page illustrated bulletin H-486.

64. Fans & Blowers

Standard Electric Mfg. Co.—There's a size and type of fan or blower for every air moving need described in 24-page illustrated catalog "Fans-Blowers".

65. When & Why a Slinger

Beardsley & Piper Div., Pettibone Mulliken Corp.—Just ask for bulletin 1515 if you want 28-pages of facts and pictures on Motive Sandslinger, Tractor Sandslinger and the Motive Speedslinger. It tells how a slinger rams sand into molds as well as why and when a slinger should be used. Which slinger to use to do the best job under particular conditions is described.

66. Bulk Handlers

Frank G. Hough Co.—Series of 4, 8 and 12-page illustrated brochures with Nos. 183-E, 204, 207, 208, 218 and 220 give many suggested applications, mechanical features and specifications of line of Hough Payloaders —four-wheel bucket type bulk materials handlers. Some have power steer and four-wheel drive. Capacities are from 12 cu ft to 1½ cu yd.

67. Mixers

Kent Machine Co.—Here are two 4-page illustrated catalogs, one on the continuous VoluMixer, which has a mixing capacity equal to a 70 cu ft batch mixer and feeds up to four materials, plus cement. Other catalog gives you the specs on a batch mixer, offered with capacities from 12 to 50 cu ft.

68. Core & Mold Ovens

Foundry Equipment Co. — Well written and illustrated, this article (it's a reprint of an AFS paper) entitled "Modern Foundry Core and Mold Ovens" by Charles A. Barnett, brings you up-to-date in this field. Get it—it is 21 interesting pages long.

69. Foundry Equipment

Jeffrey Mfg. Co.—Illustrations and specifications on a diversified series of foundry products, including aerators, bucket elevators, castings handlers, conveyors, flaskfillers, pulverizers, sand systems, screens and many others are found in this 68-page illustrated catalog 845.

70. Hydro-Sand Blast Equipment

Pangborn Corp.—For an easier way to perform cleaning and core knockout operations on castings weighing 50 lb or more, don't miss reading 10-page illustrated bulletin 1110. Installation diagrams, photos and text describe Hydro-Sand blast machine designed to clean castings up to 10 tons. Blasting is done by one or more turret guns which discharge up to 75 gal of water and 200 lb of sand per minute at pressures of 1200 to 200 psi.

71. Molding Machines

Wm. H. Nicholls Co.—How use of jolt-squeeze and pattern draw molding machines, available in various capacities and models, can give mold quality, quantity and consistency is outlined in bulletins 3, 5, 6, 7, 8 and 12. Some are portable, some are stationary. Maybe Nicholls can save you some nickels.

72. Die Casting Machines

Lake Erie Engineering Corp.—Die casting machines for casting all the usual nonferrous metals and alloys are subject of 6-page illustrated folder 23.1. Specs for machines with zinc operating capacities of 6 to 25 lb maximum are tabulated. Capacities with other metals are correspondingly higher or lower, depending upon weight of metal.

IMPORTANT READING FOR FOUNDRYMEN
We have a limited quantity of the following reprints which we can furnish while they last.

73. Reporting Foundry Costs

"The Accountant Reports to Management" by Albert E. Grover, Cost Accountant, is FOUNDRY reprint that shows how reports to foundry executives must be thorough, comprehensive, accurate, timely and simple for most effective use. Report forms which fill these qualifications are described and shown.

74. Mobilization Plan

All the why's and wherefore's of industrial mobilization for defense production are summarized in 4-page reprint from FOUNDRY entitled "Company Mobilization Planning." Step-by-step procedures as taken by United States Pipe & Foundry Co. are outlined.

75. Boron Ain't Borin'

"Effect of Boron on Cast Iron" is an informative FOUNDRY reprint of an article by William G. Wilson, Metallurgist, Molybdenum Corp. of America. It points out that although boron additions to gray iron have been limited principally to the production of rolling mill rolls, studies indicate its adaptability to other castings, with subsequent saving in scarce conventional alloys.

76. Modern Mechanization

Geo. E. Miller, Ass't Sales Mgr., Machine Div., Osborn Mfg. Co. goes all out in explaining the many advantages offered by foundry mechanization in 8-page illustrated FOUNDRY reprint "Modern Trends in Molding Machines and Core Blowers." If you missed this when you got your March issue, you'd better get a copy now!

(*Continued from page* 236)

rim onto which rubber in hardness of from 10 to 90 durometers has been molded and a set of removable flanges which contain the rubber rim. The rubber-faced rim can be replaced with a new one should it be damaged or worn out. Wheels are available in cog-tooth design, 45 degree serrated, and straight face surfaces, and in 14 to 16 in. diameters. Wheels are made by Divine Bros. Co., Utica, N. Y., and Chicago Rubber Co., Chicago.

For More Details Circle No. 12—Page 237

Masonry Blades: Eveready Briksaw Co., 1509 South Michigan Blvd., Dept. 244, Chicago 5—Reinforced masonry blades are designed to perform difficult edge cuts, grooving cuts and grinding type cuts. Reinforced internally with layers of strong fabric, and further protected

by a safety web molded into the surface, the blade is said to withstand twisting strains and binds. Sizes range from 12 to 18 in. in diam for masonry saws and 6 to 8 in. in diam for hand power saws.

For More Details Circle No. 13—Page 237

Vacuum Cleaner: Ace Co., 112 West Washington St., P.O. Box 1212, Ocala, Fla.—Commercial vacuum cleaner is designed to handle both liquids and dry material. A 1-hp motor operating a series of fans produces suction of 55 in. water. Cleaner is equipped with a removable, enclosed, dust-proof filter said to be unaffected by moisture, metal, heat or anything that will pass through the hose. Collector tank has 10-gal dust capacity and is emptied by removing machine cover. Up to 100 ft of hose can be used on the cleaner without noticeable loss of efficiency, it is claimed. There is an attachment made of sturdy, light-weight material for every common cleaning need.

For More Details Circle No. 14—Page 237

Magnesium Cement: Flash-Stone Co., 3723 Pulaski Ave., Philadelphia 40— Combination of magnesium chloride and magnesium oxide with certain fillers and fine aggregates is said to produce a cement that sets within a few hours and forms a hard, dense, durable mass with good characteristics as a flooring material. This type of cement, composed of hard rock fractures bedded in a matrix of mineral and vegetable fibers, is supplied in dry form to be mixed on the job to a mortar consistency, then spread, leveled and finished by troweling. It is said to possess light weight, good bonding qualities, resistance to oils and greases, granite hard surface, silence, high structural strength, long life, and low maintenance costs.

For More Details Circle No. 15—Page 237

Band Machine: DoAll Co., 254 North Laurel Ave., Des Plaines, Ill.—New light duty bandsawing-filing-polishing machine of 16-in. throat and 12-in. thickness capacity provides high and low tool speed ranges. Speed is infinitely variable by handwheel

Want core plates that SAVE MONEY?

. . . then use TRANSITE CORE PLATES for easy handling, low maintenance, long life!

You get real long term economy with Transite* Core Plates. Their initial cost is low . . . and their maintenance cost negligible. Transite Core Plates are tough and corrosion-resistant. They are made from an asbestos and cement composition by a special Johns-Manville process. They resist shock and corrosion . . . will not crack or break easily.

Here are other important reasons for using Transite Core Plates:

THEY SPEED PRODUCTION—
Transite Core Plates are easily handled. They're simple to clean, too, since core wash, sand, etc. do not adhere to them as readily as to other core plate materials.

THEY MAINTAIN ACCURACY—
Foundrymen who have used Transite Core Plates for years report minimum warpage.

For cores of large mass and small surface area, perforated Transite Core Plates are also available to eliminate green cores and reduce baking time. For full details, write Johns-Manville, Box 60, New York 16, New York.

*Reg. U. S. Pat. Off.

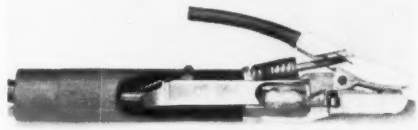
Johns-Manville TRANSITE CORE PLATES

Made of Asbestos

control and two-speed geared transmission from 50 to 300 fpm and from 860 to 5200 fpm. It is said to be capable of conventional metal sawing, high-speed nonferrous sawing and light-gage friction sawing. It takes all standard saw bands up to ½-in. width, file bands ¼, ⅜, and ½-in. width, and ¾-in. polishing bands.

For More Details Circle No. 16—Page 237

Electrode Holder: Erico Products Inc. 2070 East 61st Pl., Cleveland—Insulated electrode holder for use in welding operations weighs 25 oz and is said to be cool operating.



The cable is welded to the replaceable copper alloy jaw, eliminating mechanical connections. Other features include a cable gripper at the rear of the steel body, designed to prevent flexing at the weld and eliminating the need of insulating the connection, and adjustable spring tension in the clamp.

For More Details Circle No. 17—Page 237

Crane Trucks: Baker - Raulang Co., Baker Industrial Truck Division, 1230 West 80th St., Cleveland—New line of mobile crane trucks, particularly adapted to handling heavy castings, machinery, bar stock, sheet metal packs, and other irregular-shaped material in and out of freight cars, have 19-ft telescoping booms. Combining travel, hoist, boom, and

slew motions in one compact unit, they also supplement overhead crane equipment by working in areas not served by such equipment. Units are battery powered and have capacities of 6000 and 10,000 lb.

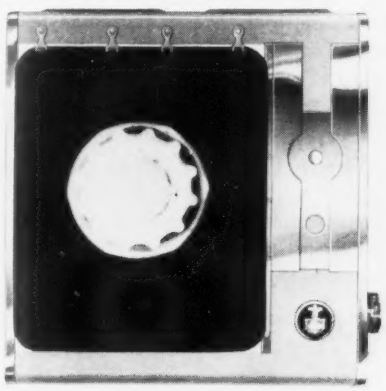
For More Details Circle No. 18—Page 237

Air Mover: Mine Safety Appliances Co., Braddock, Thomas, and Meade Sts., Pittsburgh 8—Portable

device for moving large volume of air quickly and economically in situations requiring intermittent or emergency ventilation is a horn shaped unit with a bell-formed base which converts pressure of compressed air or steam into a large induced volume of moving air. The compressed air or steam is fed through a side inlet at the bell end. Expanded at high velocity it is discharged through the outlet horn, drawing with it a large volume of the atmosphere to be moved. Three models are available: One weighs 6½ lb and is capable of moving air at 800 cfm with a 90 psi line pressure supply; another, weighing 31 lb, moves as much as 3150 cfm at 70 psi line pressure, and the third, weighing 47 lb, handles 5160 cfm at 80 psi line pressure.

For More Details Circle No. 19—Page 237

Film Illuminator: Keleket X-ray Corp., 225 West Fourth St., Covington, Ky.—High-intensity illuminator makes x-ray film inspection of indus-



trial parts quick, easy, and accurate. Viewing surface is 14 x 17 in. and critical examination of small areas is accomplished before a 3-in. spot of four times the overall intensity. A built-in adjustable mask is provided for the special viewing spot. Smooth roller clips hold film firmly, yet do not scratch. Cool front operation allows extended viewing without danger of curling or buckling film. Foot switch control, stepless voltage brightness control, and use of standard photo-flood lamps are other features. Accessories include clips and drip pan for wet examination of films.

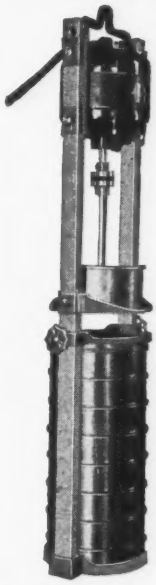
For More Details Circle No. 20—Page 237

Sand Controller: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Sand controller is an automatic sand testing unit that determines and records the permeability, green strength, green deformation and temperature of molding sand. It is de-

COMBS FOUNDRY RIDDLES

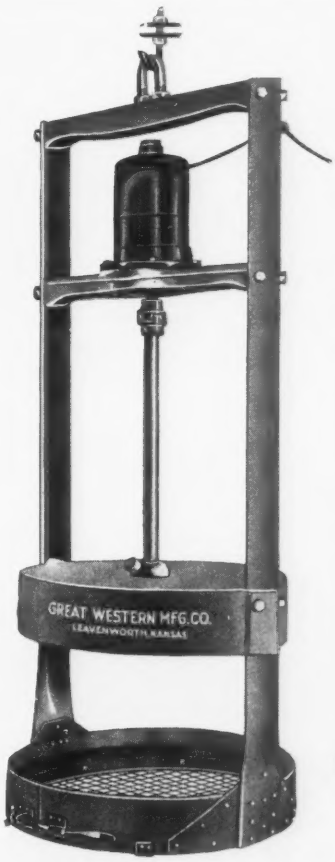
SAVE MAN POWER! MOTOR POWER!

WORLD FAMOUS!

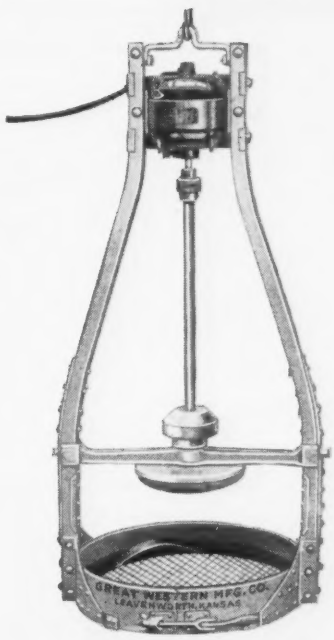


Type "HL" Lab Sifter for sand control $202.00 without sieves

Type "CS" with 24" square screen and automatic discharge $320.00



Type "CR" with 24" sieve $310.00



Type "V"

With 20" sieve $250.00
Also made with 36" sieve $450.00

All these machines cost less than 1c an hour for power. Quickly removable steel rim sieves can be removed, emptied and replaced in seconds. Saves up to 97% of your labor costs. Send for free descriptive folder.

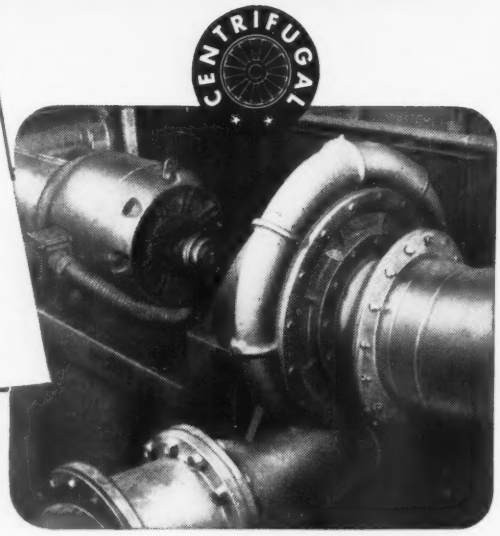
Prompt Delivery From Your Foundry Supply House

GREAT WESTERN MFG. CO.

Leavenworth — Kansas

BETTER BE SAFE THAN SORRY WHEN YOU'RE MOVING GAS OR AIR

- ☐ Choice of Rotary or Centrifugal
- ☐ Capacity matched to the job
- ☐ Easy accessibility
- ☐ Ruggedness
- ☐ Ease of installation
- ☐ Ability to handle overloads
- ☐ Long-time durability
- ☐ Freedom from breakdowns
- ☐ Low maintenance costs
- ☐ Engineering assistance
- ☐ Proved reputation of maker
- ☐ Customer satisfaction



Type OIB Centrifugal Blower for cupola service in western foundry. Capacity 6,000 cfm.

You can't afford to take chances when production and profits depend on maintained performance of blowers, exhausters, gas pumps or related equipment. So, we suggest that you check carefully the above factors before you make your final decision.

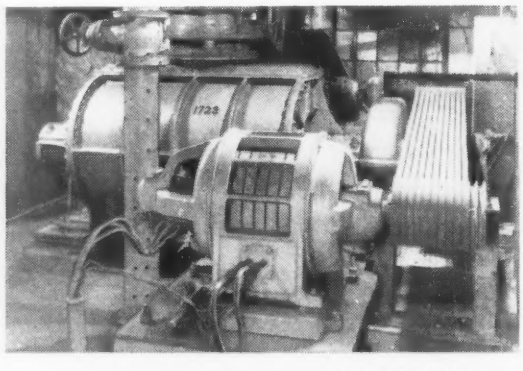
If you are faced with a choice between Centrifugals or Rotary Positives, remember that only Roots-Connersville makes both types. From our exclusive *dual-ability line*, with capacities from 10 cfm to 100,000 cfm, at moderate pressures, most buyers can find a unit closely matched to their specific needs.

We'd like to remind you, too, that for almost a century we've built only blowers and related equipment. Our products have a long, happy record for outstanding, reliable, economical performance. Our vast reservoir of engineering experience is always at your service, to meet almost every industrial problem of moving gas or air.

ROOTS-CONNERSVILLE BLOWER CORPORATION
524 Madison Avenue, Connersville, Indiana

ROTARY

Type RCS Foundry Cupola Blower, capacity 10,200 cfm. Replaced a 20-year old R-C Blower, still retained for stand-by service.



Reg. U. S. Pat. Off.

ROOTS-CONNERSVILLE
BLOWER BUILDERS SINCE 1854
ONE OF THE DRESSER INDUSTRIES

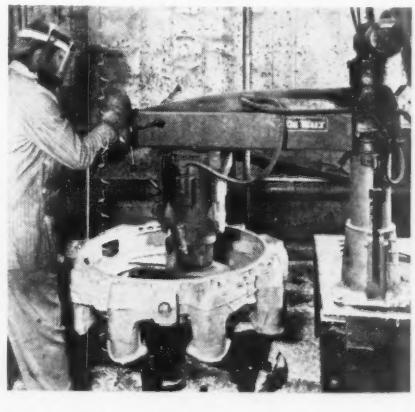
signed to add the correct amount of water to the sand in a mixer so that the sand is correctly tempered. Unit may be placed adjacent to the sand mixing equipment or sand conveyor belt in the foundry and does not require any attention by an operator, it is claimed. The rate of testing may be selected at the fastest rate of 15 seconds per sample to one test every six minutes. A continuous record of sand properties is had for each day of operation so that any off periods are easily detected.

For More Details Circle No. 21—Page 237

Rollover Machine: Johnston & Jennings Co., Division of Pettibone Mulliken Corp., 2424 North Cicero Ave., Chicago 39—Jolt rollover machine has a shortened cycle of operation because clamping and equalizing operations are combined in the downward stroke of a single, double-action clamp and draw cylinder. After rollover, the same cylinder draws the mold on its reverse stroke. Four models have table sizes of 24 x 30 in., 30 x 40 in., 44 x 54 in., and 50 x 60 in., with 12, 15, 20, and 20-in. pattern draw a 600, 1200, 2000, and 3000-lb capacities, respectively.

For More Details Circle No. 22—Page 237

Sprue Cutter: DeWalt Inc., Lancaster, Pa.—Sprue cutting machine with 10-hp driving source is capable of cutting risers up to 4 in. diam on iron castings and risers up to 2 in. diam for alloy steel castings. It is one of a new group of heavy duty metal cutting equipment. Other machines from ½ to 10 hp are available

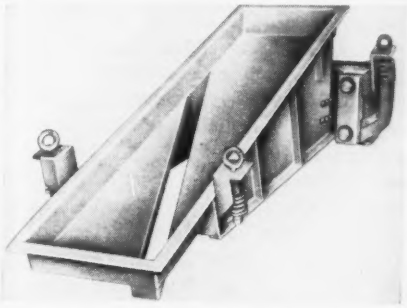


for cutting plastics, nonferrous metals or other materials which do not require the additional power and capacity of the heavier equipment.

For More Details Circle No. 23—Page 237

Spreader Feeder: Syntron Co., 540 Lexington Ave., Homer City, Pa.—Diagonal discharge spreader feeder is made up with a flat pan trough having a diagonal slot and powered

by a single electromagnet drive. The latter may be mounted either above or below the flat pan trough, depending upon the room available. Rate of feed is controllable by turning the feed control knob in the separate control box. In operation, the feeder's vibratory action flows the material



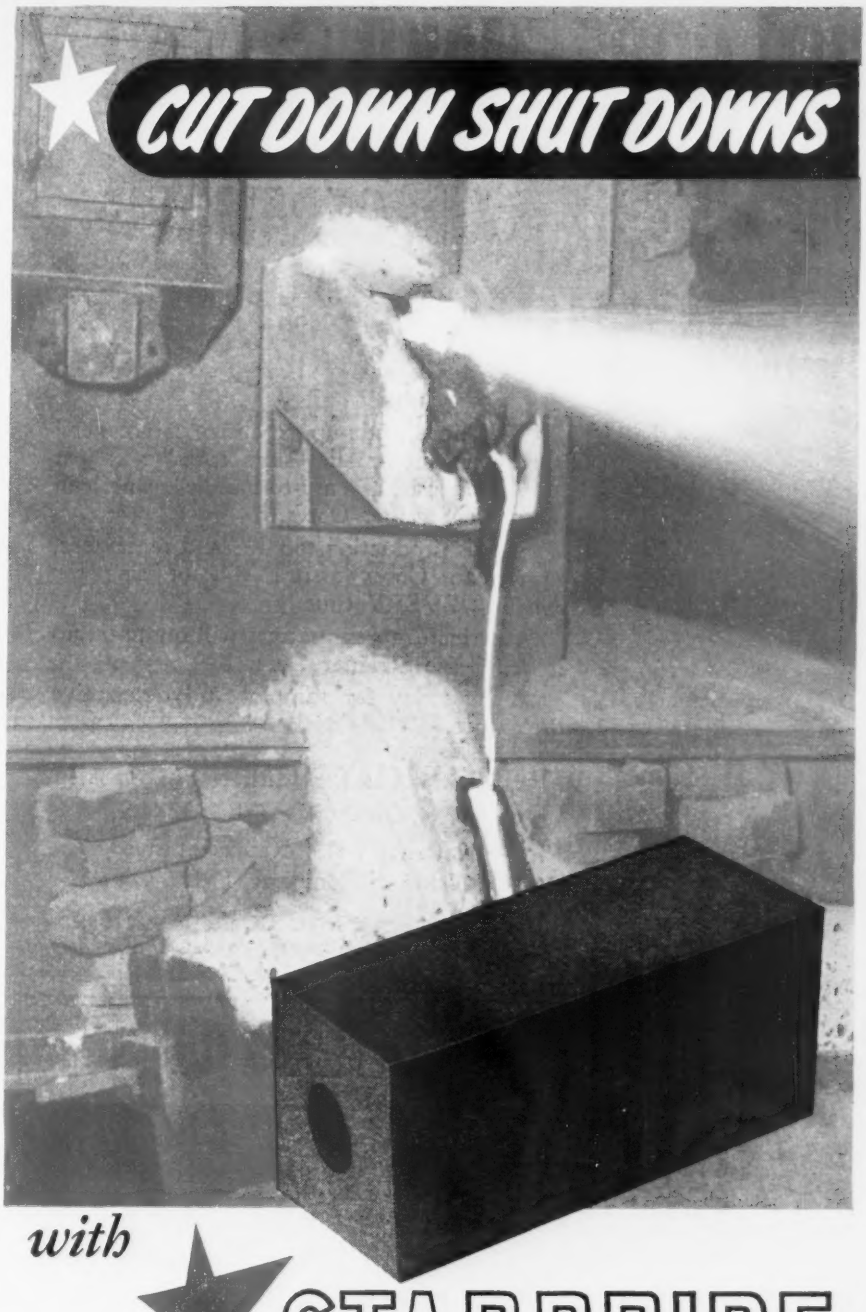
out along the trough, discharging it along the edge of the slot to form a constant, even curtain of material that is two to four times the width of the original material stream. Unit is available in several sizes and capacities.

For More Details Circle No. 24—Page 237

Grinding Wheel: United States Rubber Co., Rockefeller Center, New York 20—Cup grinding wheel is designed to retain a sharp cutting edge throughout its service life. Wheel has a hard shell of tough resin-bonded abrasive built around a core of rapid cutting resin abrasive construction. This shell, which is 3/16-in. thick, resists "mushrooming" or rounding of the wheel's cutting edge. Wear occurs evenly across the entire face of the wheel. It is particularly useful for grinding accurately hard-to-reach corners and complicated shapes. Overall diameter is tapered from 6 to 4¾-in.; thickness is 2 in., and the wheel is available for three standard types of arbors.

For More Details Circle No. 25—Page 237

Pyrometers: Assembly Products Inc., Main at Bell St., Chagrin Falls, O.—Clear plastic case pyrometers with black dial faces are made in three sizes and nine standard temperature ranges for measurements from minus 200°F to plus 3000°F. Corresponding centrigrade is shown. Automatic cold junction compensation is accomplished with a bimetal spiral on the bottom torsion spring. A variable permeability magnetic shunt across the poles of the magnet corrects for copper error. The millivoltmeter movements are medium high sensitivity at 4 ohms per millivolt. They may be supplied with calibration for any standard type of thermocouple. A calibrating resistor is included for adjusting the meter to



with ★STARRBIDE

CARBON-BONDED SLAG HOLE BLOCKS

Longer Cupola Runs because Starrbide Carbon-bonded slag hole blocks stay in use longer than ordinary blocks.

Reduced Erosion
from heat and slag flow to an amazing minimum.

Improved Flow Control
because runs are longer, more easily scheduled.

Higher Thermal Conductivity
rapidly dissipates heat.

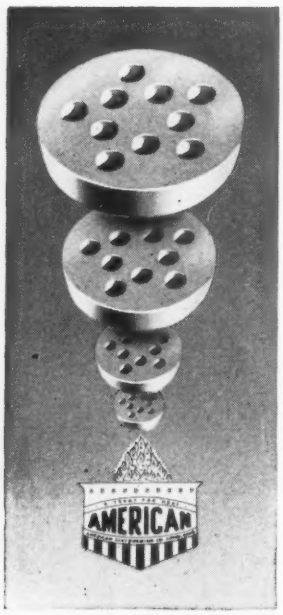
Greater Production
because shutdowns are reduced.

AMERICAN REFRACTORIES & CRUCIBLE CORP. NORTH HAVEN CONNECTICUT

ALSO MAKERS OF FAMOUS STARRBIDE CARBON-BONDED CRUCIBLES, GRAPHITE CRUCIBLES AND SUPER REFRACTORIES.

CUT CORE-MAKING COSTS!

Use AMERICAN CERAMIC *Strainer Cores!*



★ No need to tie-up expensive coremakers' time with shop-made "skim cores" . . . just use economical, easy-to-handle American Ceramic Strainer Cores.

Speeds production too . . . and remember, American Cores assure you of slag-free castings EVERY time.

American representatives will quote prices on any size Strainer Core.

Write today for samples and descriptive literature.

AMERICAN CLAY FORMING COMPANY
TIFFIN, OHIO ★ TYLER, TEXAS
National Sales Representative
Williston & Company, Delta, Ohio

MANUFACTURERS OF SPECIALIZED REFRACTORIES FOR OVER 30 YEARS

BROWNING

HYDRO ELECTRIC BUCKETS

• • •

1½ yd. capacity

• • •

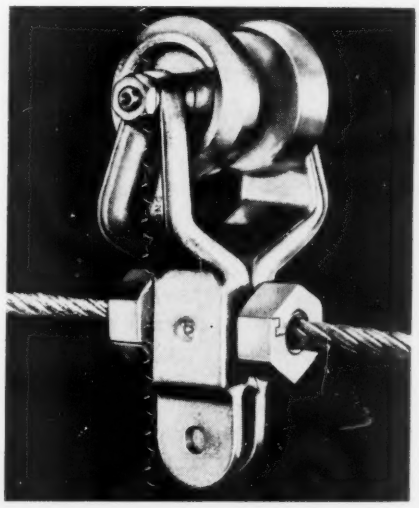
Ask for our Bulletin "F"

VICTOR R. BROWNING & COMPANY, INC.
Chagrin River Road
WILLOUGHBY (CLEVELAND), OHIO

different length of thermocouple leads. Instruments are designed for semiflush mounting in panels of nonmagnetic material. They may be supplied for steel panel mounting.

For More Details Circle No. 26—Page 237

Trolley Brackets: Daigle-Gaboury Inc., 20175 John R, Detroit 3—Development of a split nut and trolley bracket assembly permits use of $\frac{5}{16}$-in. steel core cable in overhead monorail cable conveyor systems for heavy duty service. The cable passes through sleeves of the split bracket; sleeves have internal serration. Externally, they are tapered and threaded. When the cable is enveloped by the bracket sleeves, the halves of the split nut then are brought together on the sleeve and turned on the expanding threads of the taper. In this way the nut exerts a 360-degree compression on the sleeve, causing it to establish a biting hold on the cable



with its internal serrations. It is claimed that the trolley brackets will withstand pull loads up to 10,800 lb without indications of slipping.

For More Details Circle No. 27—Page 237

Graphite Lubricant: Reynolds Industries Inc., 4500 Euclid Ave., Cleveland 3—Synthetic colloidal graphite, a dry lubricant, is offered in 12 oz aerosol dispensers. The product is resistant to extremely high or low temperatures and finds foundry application in lubricating conveyor belts that are exposed to extremes of temperatures, in die casting work and other extreme temperature applications.

For More Details Circle No. 28—Page 237

Universal Hub Wheel: Carborundum Co., Niagara Falls, N. Y.—Universal hub contact wheel consists of a three-part bolted metal assembly which includes a flanged universal hub, a serrated rubber tire and a side plate. The tire, when worn out, is discarded, and is replaced by a new

SMALL ADDITIONS CUT COSTS . . . SAVE TIME . . .

You can obtain better copper and copper alloy castings by adding Lithium the newer and surer way—in the more handy cartridge form exclusive with Metalloy.

LITHIUM CARTRIDGES reduce casting costs . . . increase tensile strength and elongation . . . decrease porosity . . . reduce grain size. Entrapped gases are eliminated, resulting in sounder castings. End result: improved castings—at less cost—with less trouble.

As a Nickel Bronze degasifier, Lithium Cartridges make possible a dense, fine grained metal.

HERMETICALLY-SEALED in copper tubing, Lithium Cartridges come in three convenient sizes: 2.25, 4.50, and 9.0 grams.

Try Lithium Cartridges in your own plant, *today*. You will get better castings at lower cost. Write Dept. F for details of actual foundry tests. No obligation.

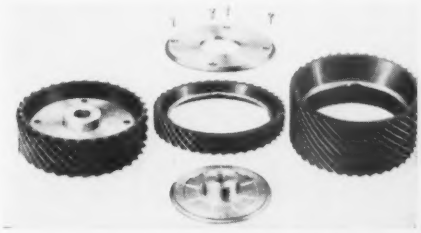
SPECIALISTS, we devote 100% of our time to Lithium—its research, development, production and application—for industry.

IF IT'S LITHIUM—IT'S METALLOY

LITHIUM CORPORATION of America, Inc.

METALLOY CORP., Division
Rand Tower
Minneapolis 2, Minnesota

tire at less cost than a standard new contact wheel replacement. A single universal hub and plate unit will mount a variety of rubber tires of from ¼-in. up to 6 in. in width, and from 5 to 106 durometer in hardness. Tires may be changed without



removing hub from the spindle. Each part of the assembly—hub wheel, plate and tire—is separately balanced. Thus, all hubs, plates and serrated rubber tires are not only interchangeable but are in balance in any combination of assembled contact wheel units. Chicago Rubber Co. co-operated in design and development of the assembly.

For More Details Circle No. 29—Page 237

Barrel Machine: Rampe Mfg. Co., 3320 St. Clair Ave., Cleveland 14—Barrel finishing machine has a hexagonal steel burring barrel of 200 lb capacity which is turned at 33 rpm by a ¼-hp, 110-v ac single-phase motor. Specifications include antifriction bearings throughout, automatic slack take-up to keep turntable belt tight, floor space required—19 x 36 in., height—33 in. and weight—130 lb. Barrels are furnished

unlined or lined with vinyl plastic, which is resistant to oil and chemicals.

For More Details Circle No. 30—Page 237

After Cooler: Niagara Blower Co., 405 Lexington Ave., New York 17—After cooler for compressed air or gases cools by evaporation of recirculating water sprays on the surface of tubes through which the compressed air passes. The equipment is designed for installation outdoors to provide cleaner compressed air and save space in industrial buildings.

WHEN YOU USE SCIENTIFIC Pressure Cast MATCH PLATES

You **GET**

ACCURATE PARTINGS, TRUE REPRODUCTIONS, LOWER PATTERN COSTS

You **SAVE**

EXPENSIVE PATTERN DUPLICATION, EXCESSIVE CLEANING COSTS

You **AVOID**

CENTER SHRINKS, DRAWS AT PARTING

IT WILL PAY YOU TO GET THE DETAILS. Write for New Bulletin No. 52.

The* SCIENTIFIC CAST PRODUCTS *Corp.

1390 East 40th Street
CLEVELAND 3, OHIO

2520 West Lake Street
CHICAGO 12, ILLINOIS

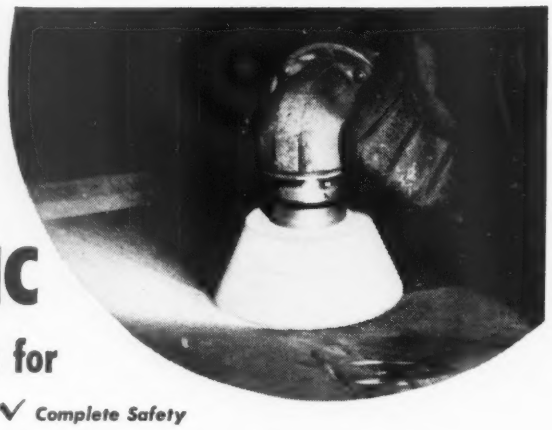
HOW TO STOP SLAG-HOLE FAILURES

Operators of continuous pour cupolas report CARBOFRAX silicon carbide blocks retain correct hole size, even through long runs. They are completely dependable—your best way to avoid costly slag hole failures. One trial order will show why. For further data, write Dept. V-82, Refractories Division, The Carborundum Company, Perth Amboy, N. J.

Use slag-hole blocks by

CARBORUNDUM
Trade Mark

"Carborundum" and "Carbofrax" are registered trademarks which indicate manufacture by The Carborundum Co.



CHECK

... then choose

ATLANTIC

Grinding Wheels for

✓ *Maximum Productivity* ✓ *Complete Safety*

✓ *100% Speed-Tested Durability* ✓ *Lower Operating Costs*

EVERY SINGLE ATLANTIC WHEEL MADE — from the 2 inch size right on up — is test run at a 50% higher speed than that required for normal snagging operations. This assures smooth, dependable cutting action plus an extra measure of on-the-job safety. Then, too, because all Atlantic Wheels are made with a special, extremely rugged Resinoid Bond, they naturally wear longer . . . permit continuous, high-speed grinding . . . and never have to be dressed to restore cutting surfaces.

CHECK THESE and other time and labor-saving Atlantic advantages for yourself. Send for the new, fact-packed Atlantic Grinding Wheel Catalog today . . . you'll find it's filled with complete information on hundreds of different type wheels for every job in the shop. Atlantic Abrasive Corp., 567 Pearl St., So. Braintree, Mass.

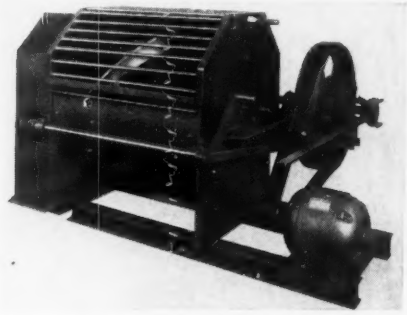
ATLANTIC ABRASIVE CORP.

South Braintree 85, Massachusetts

Freezing is prevented in winter by automatic control which shuts off freezing cold air from the spray chamber. The cooling medium is air at the atmospheric wet bulb temperature which is cooler than the average summer temperature of surface cooling water. Since the compressed air always is cooled below the atmospheric dry bulb temperature it prevents condensation in compressed air lines and damage to pneumatic tools, paint sprays and plant processes.

For More Details Circle No. 31—Page 237

Sand Mixer: Kent Machine Co., Cuyahoga Falls, O.—Line of sand batch mixers includes models ranging



in capacity from 12 to 50 cu ft. They are constructed of steel and feature safety charging and discharging, antifriction bearings and renewable linings. Mixers are variable in shaft speeds, in number and kind of mixing blades and in type of drive.

For More Details Circle No. 32—Page 237

Scoop Attachment: Towmotor Corp. 1226 East 152nd St. Cleveland 10—Scoop attachment for fork trucks is designed for positive handling of free-flowing or loose materials. Easily tripped for gravity dumping at varied heights the scoop is specially suited to operation in close quarters. The optional slice bar shown in accompanying illustration prevents full

loads from spilling while being moved over uneven surfaces. Slice bar operation is automatic. It remains open 18 in. when scoop is on the floor. As the scoop is raised the bar begins to close and is closed completely when bottom of the scoop reaches a

height of 9 in. above the floor. Scoop capacities without slice bar are 10, 12, 13, 15, 17 and 19 cu ft; with slice bar—10, 12, 13, 15 and 17.

For More Details Circle No. 33—Page 237

Variable Speed Units: Sterling Electric Motors Inc., 5401 Anaheim-Telegraph Rd., Los Angeles 22—Variable speed motor units with single reduction gears in ratings of 20 and 25 hp are manufactured in speeds of 728 rpm and lower with infinite speed adjustment within the ranges of 2:1, 3:1, or 4:1. Features of the drive are: Positive adjustment of pulleys, accurate maintenance of speeds under varying loads, belt tension in proportion to load, positive oil seals, single train helical gears, herringbone rotor, and direct-through ventilation. All ratings are available with drip-proof or splash-proof construction

For More Details Circle No. 34—Page 237

Gloves: Riegel Textile Corp., P.O. Box 170, Grand Central Station, New York 17—Plastic dots, permanently set into standard 10-oz canton flannel work gloves are said to increase glove wearing qualities. The new

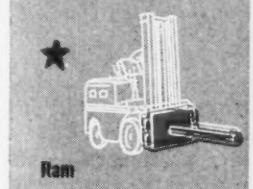
product retains the lightness, flexibility and comfort found in regular canton flannel gloves plus offering increased resistance to abrasive wear.

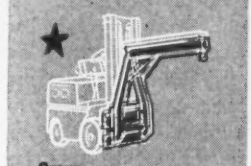
For More Details Circle No. 35—Page 237

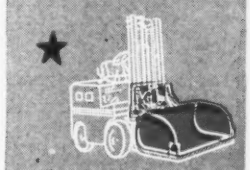
Pyrometer: Pyrometer Instrument Co., Bergenfield, N. J.—Surface pyrometer for accurate surface and subsurface temperature measurements is available with a selection of 14 different types of thermocouples and extension arms to meet varied temperature measuring problems. It can be equipped with a quick-change connector, permitting thermocouples to be snapped and locked onto the extension arms quickly. Thermocouples are interchangeable without adjustment or recalibration. A lock swivel provides for locking thermocouples at any desired angle. Instrument has automatic cold end compensation, and temperature indications are shown on a direct-reading dial. Pyrometer is available in five different temperature ranges.

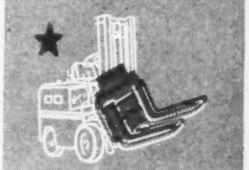
For More Details Circle No. 36—Page 237

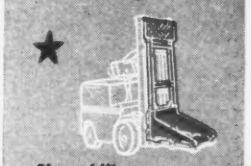
Overhead Guard

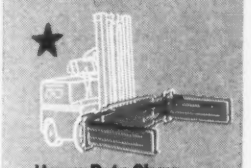

Ram

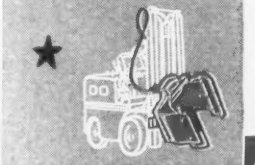

Crane

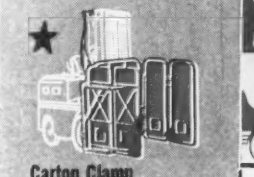

Shovel


360° Rotating Device


Clamp-Lift


Heavy-Duty Clamp


Rotating Roll Clamp

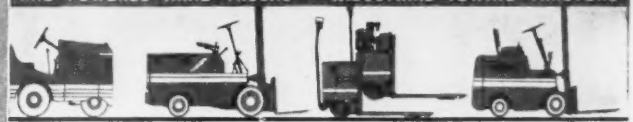

Carton Clamp

Bartel Device

"Hitch" Your CLARK Fork Trucks TO THESE Star Attachments

Every CLARK fork-lift truck saves money—
—a *lot* of money—for its user. Some save more than others because they are used more effectively — more efficiently — more regularly They aren't allowed to stand idle "in between jobs." Demountable CLARK attachments enable them to do at great savings many jobs outside the popular concept of materials handling (snow plowing, coal shoveling and plant maintenance work, for example), and to do more and better jobs within that concept. Let CLARK help *you* make the most of and get the most from *your* fork-lift trucks. For your profit's sake, talk over your handling operations with the CLARK dealer nearest you—he's listed in the Yellow Pages of your telephone book.

CLARK ELECTRIC AND GAS POWERED FORK TRUCKS
AND POWERED HAND TRUCKS · INDUSTRIAL TOWING TRACTORS



INDUSTRIAL TRUCK DIVISION • CLARK EQUIPMENT COMPANY • BATTLE CREEK 16, MICHIGAN
Please send: ☐ Basic Facts Book. ☐ Condensed Catalog ☐ Material Handling News ☐ Have Representative Call.
Name
Firm Name
Street
City Zone State
AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

CONFERENCE STRESSES HEALTH PROTECTION MEASURES

For Many Foundry Exposure Problems

By HOWARD C. TUTTLE
Detroit Editor
FOUNDRY

WHEN plans were being laid for a conference at the School of Public Health, University of Michigan, on health protection in foundries, the program was aimed at providing information for operators of small Michigan foundries. After the two-day conference, this spring, a check of the registration disclosed that Michigan was only one of 11 states and two foreign countries with representation.

Furthermore, sights were somewhat optimistically set for 50-60 people to be present. Attendance reached 83.

These achievements indicate the need foundrymen feel for good, practical information on foundry health hazards and means for their elimination.

The conference would have missed its mark if it had tried to be all things to all people. Some of the medical men there expressed dissatisfaction with the non-technical nature of most of the discussions. To professional industrial hygienists, the subject matter was "old hat." But to the men who fit plant safety and health work into their many other personnel, administrative or production activities in foundries it was stuff right down their alley. W. G. Ferrell, vice president—manufacturing, Auto Specialties Mfg. Co., St. Joseph, Mich., summing up the conference, said that the information presented could not be obtained from any one source and could be brought together only at great cost. Top men with a wealth of knowledge and experience in health and foundry fields were assembled for the unique program.

The conference had as its sponsors the U. of M. School of Public Health and Department of Production Engineering, Michigan Department of Health, Detroit City Department of Health, the Institute of Industrial Health, and the American Foundrymen's Society. Representatives of these organizations and a liberal sprinkling of industrialists served on the planning committee.

Keynote address by A. C. Hensel, director, personnel relations division, Albion Malleable Iron Co., Albion, Mich., emphasized the importance of the foundry industry—America's fifth largest industry—and how through improvements in technology the industry is working to insure job security. Health security, said Mr. Hensel, must not be neglected either. In most cases payrolls in foundries are half as large as an individual company's net worth. "Our greatest investment is in our workers," he declared. Working conditions have a direct bearing on the accident rate and on the exposure of men to health hazards.

Warning that it is up to foundries to improve themselves or the government will increasingly force improvements, he said: "We could be impelled to install costly equipment which might not help the situation at all." Purpose of the conference, he stated, is to show what health problems foundries have and how they can be licked. That they can be solved he proved conclusively by explaining what Albion Malleable has done in making itself a showplace of the foundry industry. As a sales tool and attraction to workmen, Albion Malleable has made its clean-up and modernization program pay off many times over.

Dr. Oscar A. Sander, industrial medical consultant, Milwaukee, explained the nature of disease caused by dust. Silicosis, he declared, is completely preventable, but some foundries continue to produce it. Admitting that steel foundries, where cleaning of large closed cored castings is difficult, have a particularly tough problem, he emphasized his belief that every foundry is capable of bringing the silica content of its air down to safe limits. "If you have a foundry producing silicosis," he continued, "you should leave here and eliminate the causes."

Explaining symptoms and stages of the disease, he hammered at one important point—that it can be arrested and that too many cases of removal from foundry employment, disability and compensation are doctor-induced. Doctors, he said, often make the mistake of using shadows in lungs caused by iron dust as a reason for advising patients to leave foundry work. An educational program is going on to convince doctors that foundry work does not necessarily jeopardize health, and that doctors can prevent ailments which foundry workers develop at doctors' suggestion.

COMPANY OFFICERS who officiated at the opening of the new J. O. Ross Engineering Corp. plant at Highland Park, N. J., Apr. 12, were, left to right: S. W. Fletcher, president; J. O. Ross, board chairman, and R. Sadwith, vice president in charge of manufacturing. Company makes industrial air systems, including cupola hot blast equipment and core and heat treat ovens. The new plant adds 75,000 sq ft of manufacturing facilities plus offices and a testing and research laboratory

The foundry industry, however, is to blame for some of its troubles. As long as it considers a man unemployable for first-stage silicosis, he said, compensation commissions can't be blamed for their award attitudes. Wisconsin foundries have joined to hire first-stage silicosis sufferers, thus breaking the vicious circle of a man out of work applying for disability compensation.

Instruments used to collect and analyze air samples were described in a paper prepared by Donald Van Farowe, chief chemist, Division of Industrial Health, Michigan Dept. of Health. In his absence it was delivered by Donald Fowler, regional supervisor for the division. Two types are used for collection, one providing a "grab" sample, the other operating continuously. Grab sampling, while useful to spotlight dust hazards of certain operations, should never be used alone, being subject to many variables.

Dust particles constituting a health hazard are below 10 microns in size, particularly those less than 5 microns. Researchers, he said, have cause to believe that those under 1 micron are the most troublesome. In addition to dust collecting and analyzing apparatus he described instruments for determining presence of harmful fume.

To Control Dust

The general subject of foundry health hazards having been discussed, the program then turned to means of controlling dust.

Herbert J. Weber, chief industrial hygienist, American Brake Shoe Co., Chicago, cited the profound importance of good housekeeping as a control measure. In one brass foundry, he reported, 14 cases of lead intoxication were being produced each month. With no change in processes, equipment or ventilation—just a strict housekeeping regimen—this hazard was eliminated completely. In seven years of it there has been no case of lead intoxication. A foundry may spend a lot of money on ventilation and overlook the accumulation of many years of dust settled on the building's superstructure where it may be dislodged by air movement, vibration, etc. A clean-up and keep-clean campaign is in order before anything else is done.

Poor maintenance also can offset the benefits of ventilating equipment. For instance, broken or open windows can negate the effect of power ventilators; man coolers improperly directed can offset exhaust hoods. Compressed air, he said, should be used with extreme care. Vacuum

MORE CASTINGS AT LESS COST
with PRESSURE-CAST ALUMINUM
MATCHPLATES and COPE & DRAG PLATES

Good castings from good matchplates or cope & drag plates. PPC will make plates with smooth finish, accurate partings and absolutely proper alignment to speed your production with accuracy. Always get quotations first from PPC.

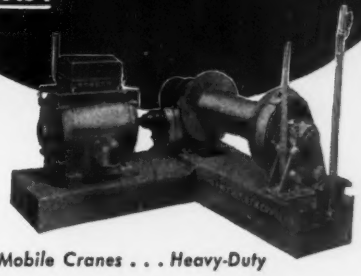
Plaster Process Castings Co.
6922 Carnegie Ave. • Cleveland 3, Ohio
Affiliate: Toledo Matchplate Co.
534 State St., Toledo 2, Ohio

PRESSURE-CAST MATCHPLATES
COPE & DRAG PLATES

ONE MAN and a *Silent Hoist* electric-driven Car Puller can pull and spot cars . . . warp barges . . . drag pallet or skid loads, logs, quarry stone, heavy equipment . . . bend pipe . . . open hopper doors... etc. ... and Cut Your Materials-Handling Costs!

SOME TYPICAL USERS:
Bethlehem Steel (Coke Ovens), American Bridge, American Car & Foundry, American Brake Shoe, U.S. Steel, General Motors, Republic Steel, Youngstown Sheet & Tube

Write for Bulletin No. 64A



Mfrs. of KRANE KAR Swing-Boom Mobile Cranes . . . Heavy-Duty Fork LIFTRUK . . . Cranes for Motor Trucks . . . Capstans, Gypsies, Single and Double Drum Winches.

SILENT HOIST & CRANE CO., 885 63rd ST., BROOKLYN 20, N.Y.

to eliminate sand conditioning problems like these . . .

A New York Foundry says of its Sandcutter: "We find the sand is far more properly mixed and the moisture is distributed evenly throughout the heaps. We find we are able to use finer sand due to thorough mixing and, of course, get a better finish."

poor sand conditioning

From an Ohio Foundry: "With our Sandcutter we found that we were able to reduce our costs greatly, obtain a more uniform sand which in turn aided us in increasing our production, reducing our foundry losses and producing a casting of better finish."

high cost

A Wisconsin Grey Iron Foundry reports: "We have found that we have cut our molding scrap losses better than 35% with our Sandcutter as compared with the hand method of cutting sand."

molding defects

From Chattanooga, Tennessee: "Before our Sandcutter was installed we were operating twenty-two floors, requiring the services of three shakeouts. At the present we are operating thirty-one floors with no increase in labor."

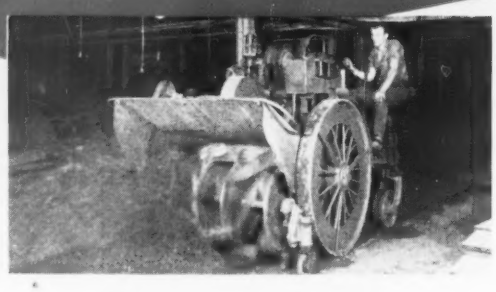
low productivity

In Jersey City: "Absenteeism was formerly a serious condition with the night crew, but now that the Sandcutter has disposed of the 'back breaking labor' of continuous shoveling, we have also disposed of our absentee problem."

absenteeism

switch to SANDCUTTER®

There is a size Sandcutter available for every sand conditioning requirement. Write for complete information today.



SANDCUTTER® American

WHEELABRATOR & EQUIPMENT CORP.

505 S. Byrkit St., Mishawaka, Indiana

systems can pay for themselves. A check should be maintained on the proper functioning of vacuum systems. For this purpose he described the simplicity with which a U-tube can be constructed. This should be used at several places along a vacuum line to locate leakage or stoppages.

He also described a means for proving the value of good housekeeping on a dollar-and-cents basis. This method of computation uses insurance premiums as the yardstick.

Three categories of dust control measures were explored by Dr. Edward Meiter, Employers Mutual Insurance Co., Milwaukee. These are: Isolation, substitution, and use of wetting agents. Dust control, he emphasized, is essential, but it must be "sold" to employers on a personal basis. Bulletins won't do it, he said, and an employer gets little value out of knowing what his dust count is unless somebody such as an industrial hygienist or safety engineer can explain the significance. Dust control problems are not as widely recognized by small foundries as by large ones, but properly instructed, small foundries can readily be convinced of the necessity of a control program.

Control By Isolation

Dust control by isolation exposes only those men directly connected with the dust-generating operation. Isolation may be in space or in time —shakeout for example may be at night to expose a minimum number of people. In some cases it may be easier to isolate non-dusty operations—the coreroom, for example.

Substitution involves the use of less toxic materials for the hazardous ones. Citing numerous examples from foundries and other industries, he emphasized that free silica is the thing to beware of in foundries and suggested some measures such as use of steel shot and use of parting compounds with little or no free silica.

The oldest method of dust control is by use of water, but ordinary water frequently won't penetrate enough to solve the problem. Wet water may be used instead, applied possibly at three places: Floors, point of dust origin, or in the air. Using either plain water or wet water, application is of primary importance. Wet water, he suggested, should be given a try in foundries even though only limited application may be possible.

Respirators are emergency devices, useful where mechanical ventilation is not possible, said Ralph G. Smith, Detroit Dept. of Health, who was pinch-hitting for A. Kamaila, industrial hygienist in the depart-

ment. Referring to respirators as probably the original method of minimizing dust intake, he said employers may be at fault when workers fail to wear the devices properly. The worker should be impressed that his own self-interest dictates use of them where necessary. And visitors and members of management should wear respirators when they are in the work-area of men who are required to wear them. Employers, furthermore, have a duty in making sure that cleanliness and effectiveness of the devices is maintained, and in providing proper facilities for their up-keep. If air-supplied respirators are used, good air must be provided. Odors and carbon monoxide gas must not be allowed to be picked up by the compressor. Advantages of a centralized system for the distribution and care and cleaning of respirators were also explained.

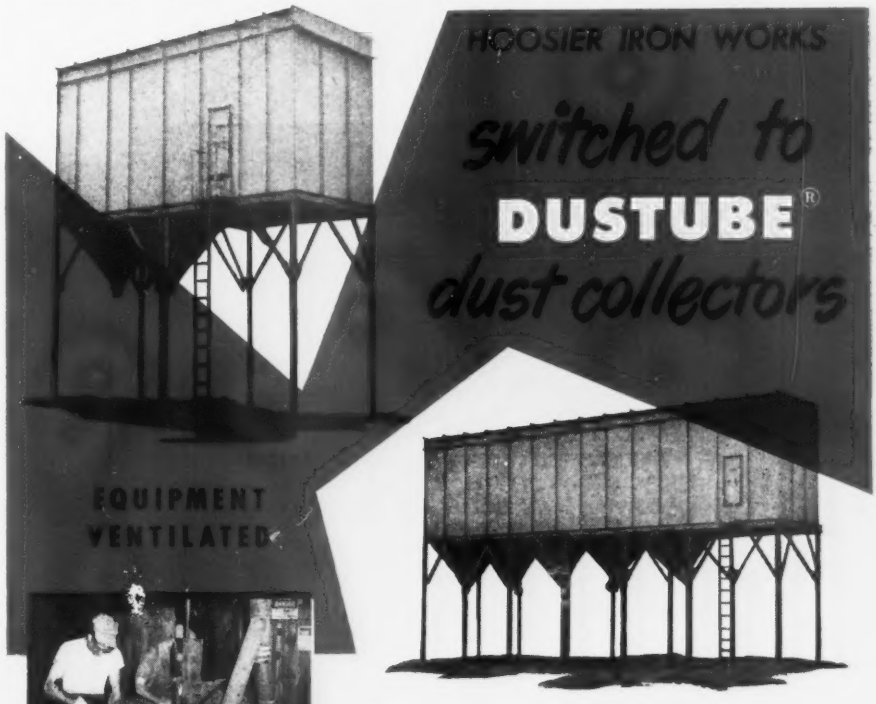
Discusses Fundamentals

Dr. William N. Witheridge, ventilation consultant, General Motors Corp., Detroit, discussed the fundamentals of ventilation. Shape of building and direction and velocity of wind must be taken into consideration in providing natural ventilation, he explained, adding that it is vital in every plant that one man be made responsible for this phase of the ventilation program. Describing the various types of mechanical equipment available to ventilate various foundry operations, he said that while design is important, good maintenance and inspection procedures can be more important and that a system of mediocre design can do a better job than an excellently designed unit which is not properly cared for. As soon as equipment is installed its capabilities should be ascertained so that future inspection and testing of its performance will have "bench marks" for comparison.

Recirculating air systems are growing in importance, Dr. Witheridge said, particularly for grinding operations. It is imperative with this kind of system that means are at hand to permit checks on its efficiency.

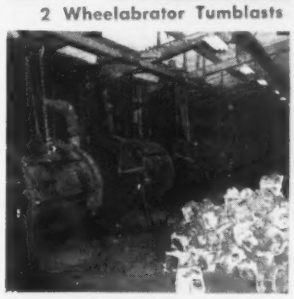
A high light of the day's activity was a number of demonstrations conducted in the university's Teaching Foundry. Equipment and procedures used for collecting and analyzing dust and fume were on display. A cover used when handling and pouring yellow brass was shown snuffing out the fumes from the crucible. Radiation control equipment and x-ray apparatus were also demonstrated. Two films—one on respirator use and the other on industrial health — were shown to the

to lower maintenance cost and eliminate a dust condition



12 Grinders

2 Wheelabrator Tumblasts


13 Tumbling Mills

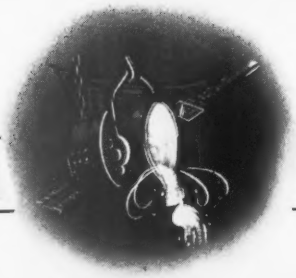
Dust is no longer a problem for the Hoosier Iron Works, Kokomo, Indiana. Officials of the Company are proud of their dust-free cleaning room since Dustube Collectors were installed to eliminate their dust condition. The former dust collection equipment was a constant source of trouble. Its efficiency was low, allowing dust to permeate the atmosphere and settle throughout the foundry to create a serious housekeeping problem.

Dustubes have proved their ability to remove all the dust through efficient, low-cost operation the past four years. In that time the only replacements required have been a few cloth tubes. Maintenance has been limited to regular inspection and lubrication. The low operating and maintenance cost of the Dustubes is particularly impressive considering that one collector is handling 5 to 6 tons of sand daily.

If you are interested in thorough dust removal at a price you can afford to pay, investigate the Dustube today.

American
WHEELABRATOR & EQUIPMENT CORP.
505 S. Byrkit St., Mishawaka 2, Ind.

dustube® COLLECTORS



An Answer To Your Specific Problems

ANALYST and DESIGN ENGINEER for foundry problems
CONSULTANT
for coordinating industrial problems

Specializing in
PATTERNS, MOLDING PROBLEMS, SPECIAL MACHINE DESIGN, AUTOMATIC CYCLE CONTROL, LIAISON and COORDINATING

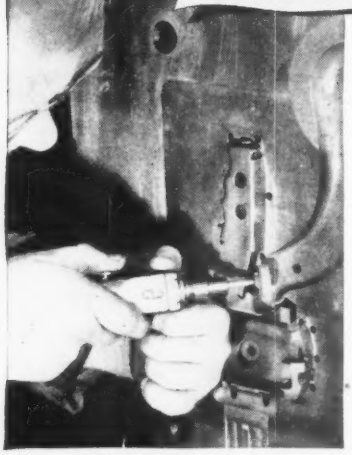
Harold E. Pridmore

20 Washington Circle
Hinsdale, Illinois

the outsider often sees what the insider often misses

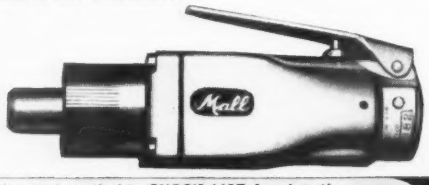
How Much is "TOOL FAG" Production L···A···G Costing You?

Prevent this LOSS with Mall Pneumatic Shop Tools



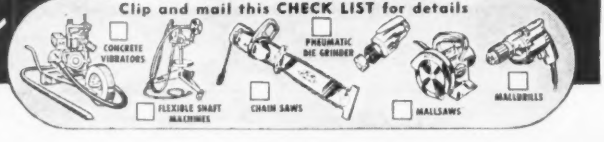
Turn out more work, easier, faster, with lightweight, vibrationless tools that reduce fatigue to an absolute maximum. Typical of Mall compactness and precision in pneumatic tools is this No. PG-K1030L Lever Throttle Die Grinder, weighing only ¾ of a pound and easily held in the palm of the hand. With a guaranteed speed of 30,000 rpm. and a maximum of .0015 runout at the collet, this Mall Pneumatic Die Grinder assures accuracy, precision and ease of operation.

Send For Complete Illustrated Bulletin With Price List.
40 Factory-Owned Warehouses, Coast To Coast, To Serve Our Customers.



Mall TOOL COMPANY
7720 S. Chicago Avenue
Chicago 19, Illinois

Clip and mail this CHECK LIST for details



group which was present.

On Saturday, Apr. 12 the program was split into two sections—nonferrous and ferrous foundries—to discuss operations and procedures in each which present health hazards. Presiding over the ferrous sessions was Dr. R. A. Flinn, associate professor of chemical and metallurgical engineering and production engineering, U. of M. Frank A. Patty, director, Division of Industrial Hygiene, General Motors Corp., presided at the nonferrous meeting.

For the ferrous program, six operations were described in detail. Sand handling to prevent generation of dust was explained by Ray H. Moore, consulting engineer, Claude B. Schneible Co., Detroit. With slides to show various systems in use, he explained in detail the theory behind compensating hoods which provide outside air to replace that exhausted by the ventilating system.

Sources of Dust Cited

Coremaking and molding were listed by George Tubich, area supervisor, Division of Industrial Health, Michigan Dept. of Health, as being fairly low dust exposure operations. Mechanical sandslingers, however, may be dust liberators and at present no effective mechanical control from this exposure has been developed. Use of parting compounds, which in the past were primarily silica flour, accounted for about 70 per cent of the molder's exposure. The shell molding process, he said, may present an exposure problem because of its use of fine silica sand. Permanent molding's hazard is limited to some plumbagoes which may have free silica.

The molder has hazards other than dust—carbon monoxide, for one. Exposure is lower for coremakers, but core washes should be applied by brushing, dipping or swabbing. Core grinding operations can present a dust hazard depending on the wash. Dermatitis is a problem for some workers where resin binders are employed. Reaction to urea formaldehyde was explained. Personal hygiene is a basic means of controlling dermatitis, he said, and added that adequate wash facilities must be provided and the workers should be advised of the hazards of contact.

Melting and pouring operations as health hazards were explored by John Radcliffe, industrial hygienist, Ford Motor Co., Dearborn, Mich., who reported that the incidence of silicosis in one foundry is 100 per cent higher for bricklayers than for the other workmen. Dust control during furnace or cupola and ladle relining by mechanical ventilation would seem to

be prohibitively costly but ventilation of dry saws used for cutting refractories can be done efficiently. Wet saws, he said, are disliked by the men and have shorter life. Melting and pouring, as such, give rise to relatively little dust exposure.

Shakeout and core knockout can be ventilated by three methods, John Kane, manager, Dust Control Division, American Air Filter Co., Louisville, Ky., said. These are enclosed hood, side-draft, and down-draft. The enclosed hood is an ideal arrangement where it is possible to eliminate men from the work entirely. Control of ventilation becomes more difficult as air is permitted to enter the system from unexpected places, and the side-draft ventilator has to suck more air to compensate for "stack" effect of hot air at the shake-out. The down-draft idea has strong appeal because there is nothing to hamper material handling equipment, but effective dust control with a setup of this kind is just about hopeless, he said. When its exhaust action is needed most the shake-out's grates are clogged with sand, casting and flask; exhaust ducts clog, and the strong suction takes the fines away. Snap flask work where dumping can be centralized and sand handling can be enclosed offers the possibility of down-draft exhaust. Mr. Kane showed pictures of the baffles used in this kind of system.

Dust in Cleaning Room

Casting cleaning with its many ramifications was described by Kenneth M. Smith, Caterpillar Tractor Co., Peoria, Ill. Importance of safety clothes and dust collectors were emphasized and the vital role of proper maintenance of equipment for dust handling in this job was stressed.

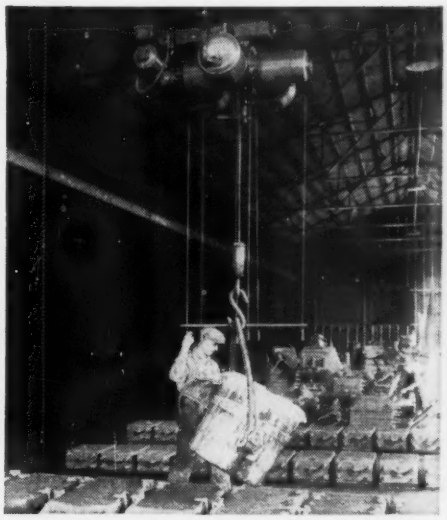
Casting grinding is an unattractive chore to most foundrymen, said Kenneth Robinson, ventilation consultant, Michigan Dept. of Health. But saddled with the job it is easier to see the need for good dust control systems for this operation when its advantages show in dollars and cents. Men, he said, are the most expensive piece of equipment in a plant, and their work is notably better when there is less dust. Maximum allowable concentration of iron dust, he believes, should not exceed 20 million particles per cubic foot. This compares with 1-1½ million particles of dust in the air of an average living room. Comparing the efficiency of various types of equipment, he said swing grinding operations are difficult to exhaust, but portable grinders used on benches permit easy dust control.

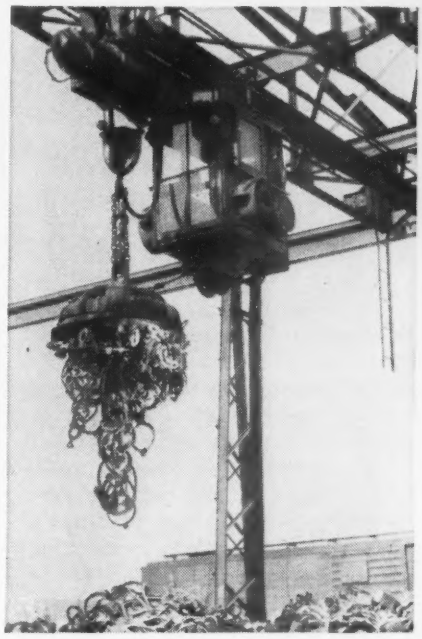
The nonferrous program, introduced by A. Burns, plant manager, Magnus

which one is right for your job?

FLOOR-OPERATED HOIST

Operator mainly occupied with other duties.





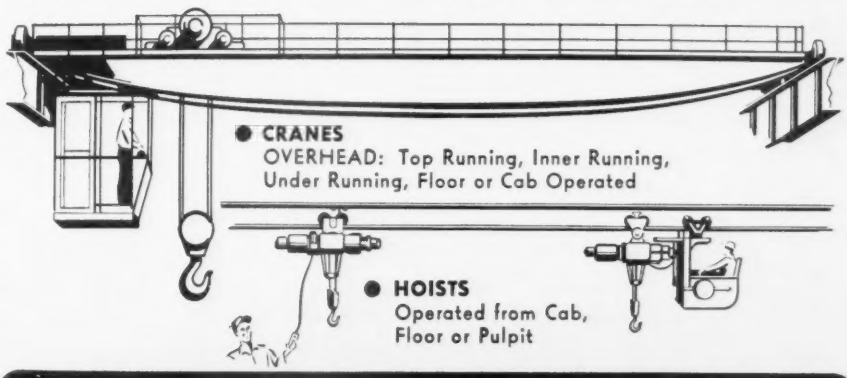
CAB-OPERATED HOIST

Operator in cab moves loads along at high speeds—occupies best vantage point for spotting or stacking.

Choosing the hoist that's right for your job calls for expert advice.

Let the Shepard Niles representative in your area guide you in your choice. He specializes in through-the-air handling — can help you select the hoist that fits your job. Write Shepard Niles today for Bulletins 127 and 177 — and ask to have a representative call.

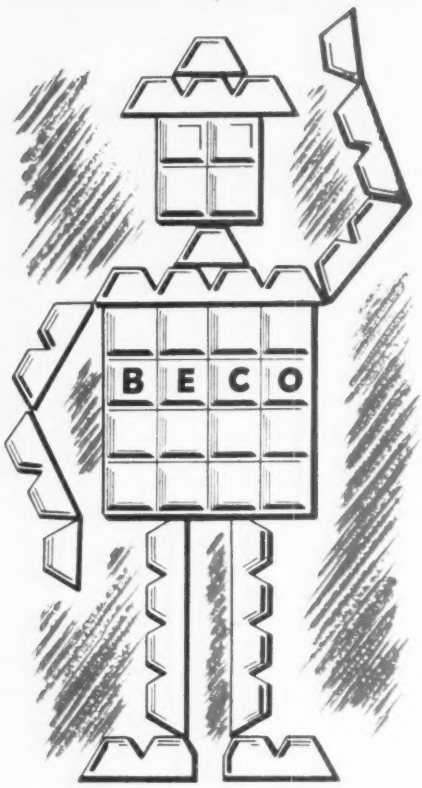
Specialists in loads through-the-air since 1903


● CRANES
OVERHEAD: Top Running, Inner Running, Under Running, Floor or Cab Operated
● HOISTS
Operated from Cab, Floor or Pulpit

SHEPARD NILES
CRANE AND HOIST CORPORATION

1320 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

"AT YOUR BECK AND CALL"



for ALUMINUM ALLOY INGOTS

Your needs, in terms of most exacting individual specifications, are met by an organization directed by technical experts of long experience, working under laboratory control with most modern smelter and foundry facilities. For the best in aluminum casting it profits you to specify "Beco".

P. C. BECK COMPANY
1422 EUCLID AVENUE
CLEVELAND 15, OHIO

Metal Division, National Lead Co., Detroit, wrapped up the nature of hazards in such foundries, the treatment of workers suffering from lead, zinc and rarer metal fume exposure, and measures which can be taken by foundrymen to minimize or eliminate the problem.

Dr. L. E. Hamlin, medical director, American Brake Shoe Co., spoke on the nature and symptoms of lead poisoning and fume fever. Describing vitamin therapy for lead intoxication, he suggested that promotion of better health increases worker resistance to poisoning. He noted, however, that individual susceptibility varies widely and some men working in "safe" atmosphere nevertheless will show high lead content in blood and urine. For these, removal from the atmosphere may be the only solution.

Dr. William G. Fredrick, chief, Division of Industrial Hygiene, Detroit Dept. of Health, explained the methods of measuring intensity and effect of lead and zinc exposure. Discovering that many operators of small foundries lack facilities and personnel to conduct regular examination of their employees by blood sampling or urinalysis, he outlined the services of the tax-supported facilities of Detroit and the state which are available to them.

George Hama, industrial hygienist, Division of Industrial Hygiene of Detroit's Health Dept., got down to the practical aspects of curbing release of harmful fumes during melting and pouring operations. Showing ventilating systems for furnaces, crucible covers, and moving ventilators which travel with the ladles, he also cited some attempts at better ventilation which actually increased the fume hazard. Air intake, he suggested, should be provided at the opposite end of the shop from the melting operation so that fumes are not taken through the entire shop before being exhausted. A foundry building under negative pressure from the exhaust system must have provision for make-up air or the chimney may turn out to be the air-supply stack, he said.

Bernard Bloomfield, industrial hygiene engineer, Michigan Dept. of Health, emphasized control of dust exposure in nonferrous foundries, showing methods of hooding dust-producing operations to maintain safe air conditions in their vicinity.

Some of the less frequently encountered hazards in nonferrous foundries were discussed by Dr. Carey P. McCord, consultant, Institute of Industrial Health, and lecturer in

Markal Paintstiks
A Complete Line

Markal Paintstiks are available in a complete line for marking hot surfaces up to 2000°F, cold surfaces as low as—50°F.

Wet, dry, icy, rough or slick surfaces can also be marked. Write for full information on the complete line.

For—Extreme heat 250°F to 1800°F . . . permanent . . . comes off in pickling bath

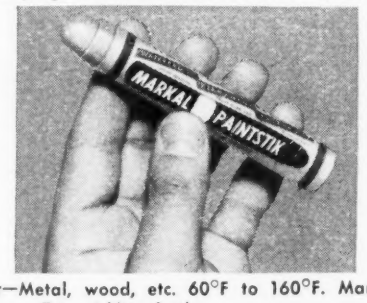
For—Hot Metal 150°F to 1500°F . . . will not run, char, flow, discolor or peel. Immersion in cold water will not deface.

For—Annealing, welding or acetylene torch work. Open hearth stickers, etc.

For—Metal to be annealed at temperatures up to 1600°F. Marking when cold.

For—Quick Drying . . . drys instantly . . . removed in pickling bath.

For—All purposes, dry, oily, or icy wet surfaces. Stampings and indentations—steel and plastics.



For—Metal, wood, etc. 60°F to 160°F. Marks come off in pickling bath.

For—Lumber either wet, dry or green. Also for crates and boxes.

For—Lumber, wet, dry, green, creosoted or Wolmanized.

Other types are available for special marking requirements; our engineers will make recommendations if you will outline your special problem.

SPECIAL MARKINGS ON REQUEST

Markal COMPANY
3050 W. Carroll Ave., Chicago 12, Illinois
THE MARK OF QUALITY
. . . MARKAL PAINTSTIKS

U of M's School of Medicine and School of Public Health. Cadmium and beryllium exposure was covered as was so-called fume fever and the reaction of magnesium particles under the skin.

Winding up the conference were summations of the day's activities by Mr. Patty and Dr. Flinn, and a general summary of the achievements of the conference by Mr. Ferrell. Emphasizing that it is possible to run a comprehensive industrial hygiene program for less than 50 cents per $100 of payroll, Mr. Ferrell said health and safety programs are not a question of spending money, but of saving money. Federal intervention will come unless state and local agencies have industry's co-operation in the matter of safe operating conditions and recognition of the health hazards. Top management *has* to be responsible and head up the safety and hygiene program.

Mr. Radcliffe, as a member of the AFS steering committee on Safety, Hygiene and Air Pollution, explained its program to date. Foundrymen, he said, are not planning to write laws, but will make factual information available to these bodies which do, and give them assistance in formulating laws which will benefit all. He said that in its campaign AFS will not enter the technical information field to the extent that it cuts into the realm of independent consultants in the matter of health and safety.

Book Review

Practical Radiography for Industry, by H. R. Clauser, cloth, 301 pages, 6 x 9 in., published by Reinhold Publishing Corp., New York. Price $7.50.

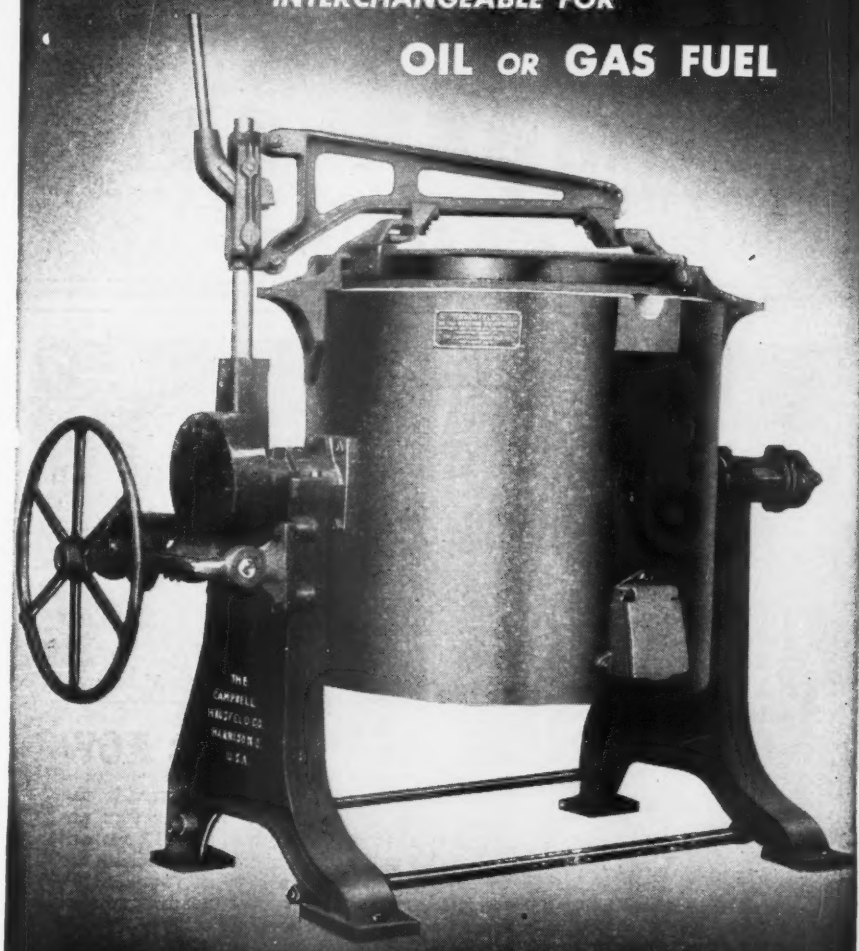
Practical information and data on the use of radiography in industry are presented clearly and concisely. Concrete working data directly applicable to performing radiographic inspection is provided. Thus, detailed information is given on set-up procedures, exposure factors and techniques, radiograph quality, films and film processing, and screens and filters.

Also included are interpretation of radiographs of castings and weldments, including identification of defects or discontinuities in various materials, and discussions of applicable standards. X-ray generating equipment and the fundamental principles upon which radiography is based are treated in a relatively nontechnical manner. Separate chapters are devoted to gamma-ray radiography, fluoroscopy, high voltage radiography, and miscellaneous applications including microradiography, thickness gaging, and high-speed radiography.

HAUSFELD

A FURNACE FOR EVERY NON-FERROUS MELTING REQUIREMENT

INTERCHANGEABLE FOR OIL OR GAS FUEL



Built for Service

The Campbell-Hausfeld Co.

300-320 MOORE ST. HARRISON, OHIO

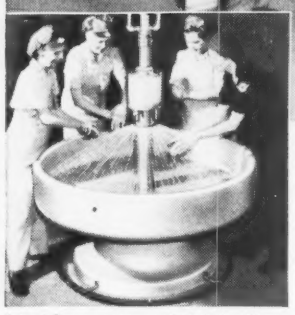
FOUNDRY LUMBER

Since 1858 we have been specializing in lumber for the pattern shop and foundry. This near century of experience has taught us lumber knowledge that can be gained in no other way. We pass it on to you as part of our service.

We carry complete stocks of Genuine Northern White Pine, California Sugar Pine, Norway Pine, Honduras Mahogany; Kiln Dried, Super-thickness, rough or dressed. We'll ship 100 feet or a carload, no matter where you are located. Contact us now; address Department F.

RIETZ LUMBER CO.

1810 N. Central Park Ave.
CHICAGO 47, ILLINOIS



8 to 10 are accommodated simultaneously at a 54-in. Bradley.

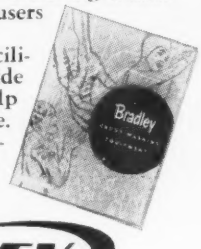
DUO-Washfountains for Smaller Washrooms

For business, school and institution laboratories, Bradley DUO-Washfountains serve two persons with clean running water from a sanitary sprayhead. Foot-control—no faucets to touch, —maximum sanitation.

Add More Bradleys NOW

Because Bradley Washfountains provide the maximum in sanitation they help prevent unnecessary absences . . . Each of 8 or 10 persons is provided with clean running water from the central sprayhead, and, with foot-control, hands touch nothing but the cleansing water. Water flow is cut off when users leave the Washfountain.

Bradleys provide more facilities in less space . . . Decide now—Catalog 5204 will help you select the correct type. BRADLEY WASHFOUNTAIN CO., 2217 W. Michigan St., Milwaukee 1, Wis.



BRADLEY *washfountains*

Company Open House Celebrates 50th Year

Despatch Oven Co., Minneapolis, celebrated its 50th anniversary with an open house June 9. Customers, suppliers, and friends attended the commemorating event. Despatch is a leading manufacturer of industrial ovens, industrial furnaces and related metal processing and finishing equipment.

The company was founded by A. E. Grapp to supply equipment for controlled heat and humidity for the Northwest milling industry. It went

C. P. DOHERTY

on to manufacture laboratory test ovens and subsequently progressed into production of ovens of all sizes and descriptions for the industries it previously supplied with laboratory ovens. Despatch grew with the expanding metalworking industry during World War I to produce foundry ovens, finish bake ovens, heat treating furnaces and related metal processing equipment.

Officers of the company are: C. P. Doherty, president and general manager; Fred Larsen, vice president and secretary; G. M. Lund, vice president and treasurer, and G. L. Schuster, vice president and chief engineer.

Investment Casting Book

Report of the Office of Technical Services, U. S. Department of Commerce, Washington 25, contains latest technical methods used in the investment casting process. It discusses history, uses, process details, precision attainable, and limitations of the process. A bibliography lists literature references, government reports, and books on this and related casting methods. Booklet PB111 001 is entitled "Investment Precision Casting," and sells for 25 cents.

EXTINGUISHING MAGNESIUM FIRES

With Boron Trichloride

BORON trichloride has been found effective in extinguishing magnesium fires in heat treating, preheating and annealing furnaces. It is convenient to use because it vaporizes readily and is therefore easily applied.

The action of boron chloride is essentially to smother the fire by limiting access of oxygen to the burning metal. It is, therefore, best adapted to use in reasonably tight enclosures, such as the furnaces mentioned. For metal burning in the open air the powder mixture, known as G-1, prepared and sold by Pyrene Mfg. Co. will probably be more effective. Where it can be used, however, boron trichloride has the distinct advantages of ease of handling and cleanliness.

The exclusion of oxygen may be accomplished in part by the formation of magnesium chloride from action of the chloride of the boron trichloride with magnesium metal. The boron, however, evidently has an important function in the extinguishing action because free chlorine and other chlorinating agents are far less effective than boron trichloride in extinguishing fires. The affinity of magnesium for boron evidently leads to formation of an impervious coating of boron alloy over the metal surface.

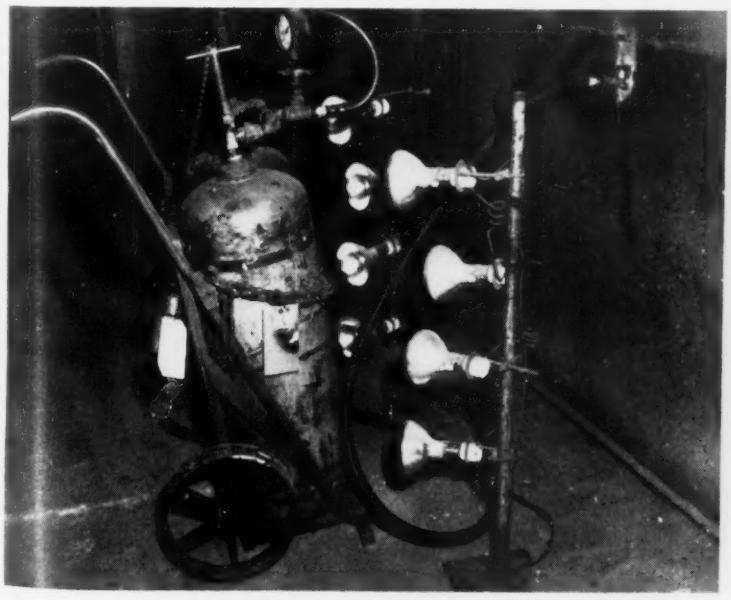
Much of the experience with boron trichloride to date on magnesium fires has been experimental, but it was used very effectively in one recorded case of an accidental fire. This occurred in a heat treating furnace in a foundry, loaded with about 1000 lb of heavy magnesium castings. The boron trichloride was applied about 10 minutes ofter the fire was discovered and within 5 or 10 minutes after application the temperature beban to drop. The fire was out when the furnace was opened 45 minutes after the boron trichloride was applied.

Examination of the furnace showed that one of the 150-lb castings had been completely burned and the others had burned to some extent. The principal damage to the furnace was some warpage of a steel panel nearest the main fire zone. Approximately 30 pounds of boron trichloride was used in this case.

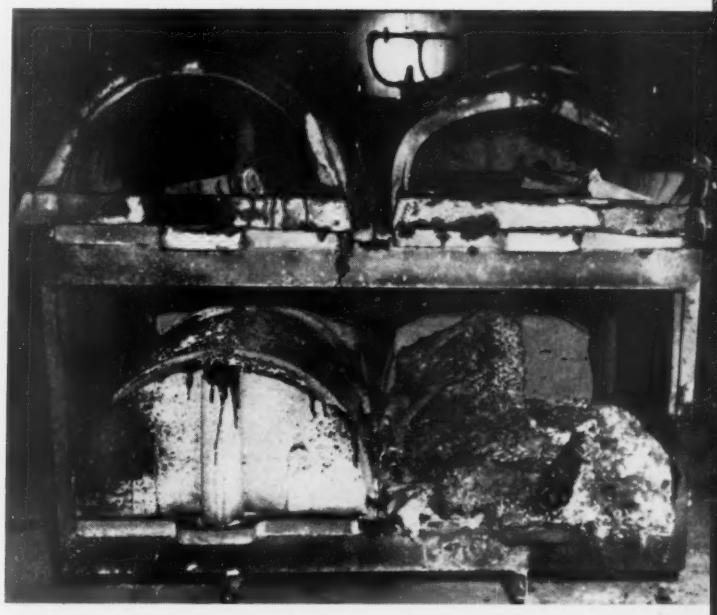
Boron trichloride is a water white to faintly yellow, mobile liquid below its boiling point. It fumes in air due to its reaction with water vapor to produce nudrochloric acid and oxides of boron. Boron trichloride is shipped in cylinders for compress gases. Its boiling point of 55° F indicates that these containers will have in excess of atmospheric pressure at the temperature prevailing in most heat treating and annealing plants. At a temperature of 176°F these containers will show 100 pounds per square inch pressure.

A suitable assembly for using boron trichloride on magnesium fires would consist of one or more 50-pound cylinders mounted on a small hand truck. A rack carrying two or three infra red lamps per cylinder should be mounted so that heat can be applied to these cylinders to insure sufficiently rapid vaporizing of the liquid. These lamps should be fitted with a suitable extension cord, long enough to be plugged in at outlets accessible to the area being protected, with the assembly near the furnace to be treated.

A distributor tube consisting of 6 feet or more of flexible hose, preferably made of neoprene, terminating in a 3-foot section of ½-in. steel pipe, should be fitted to the valve of the cylinder or to the manifold where one or more cylinders are used in the assembly. The short section of ½-in. pipe on the end of the hose is thrust into the furnace through an



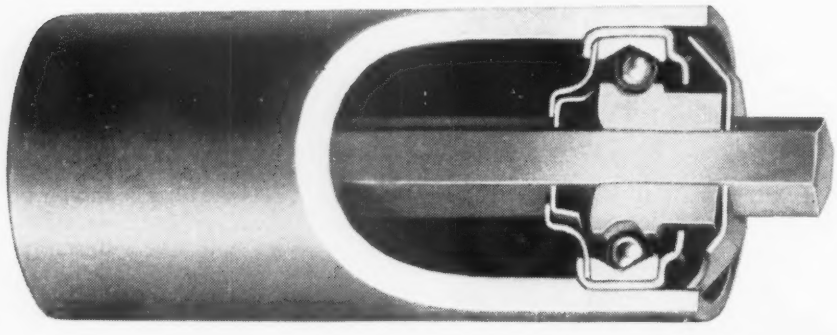
Hand truck carrying two 50-lb cylinders of boron trichloride are placed in front of heat treat furnace. Hose leads from cylinders to an opening in the furnace door. Two banks of infra red lamps for heating the cylinders complete the fire extinguishing assembly

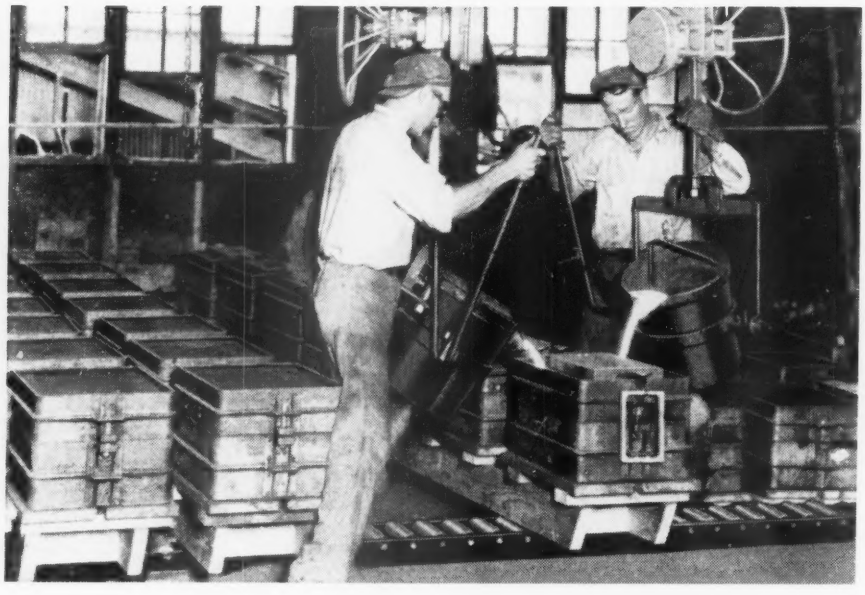


Magnesium castings which have been involved in an accidental fire. Boron trichloride was applied about 10 minutes after the fire was discovered, and within 5 or 10 minutes the temperature began to drop. The fire was out when furnace was opened 45 minutes later

STANDARD'S SHIELDED BEARINGS

Are Expressly Designed for Foundry Conveyor Service





Every Standard roller conveyor is equipped with specially designed bearings that provide the maximum of protection and durability in foundry service. Spillage of hot iron is guarded against by special steel shields. These convex shaped shields fit into the ends of rollers to repel foreign matter. An exit for small particles is provided by an opening at bottom of shield.

Foundry conveyors are designed and built in their entirety by Standard—in a wide range of sizes, weights and types. You can depend on Standard for the right conveyor for your needs — we have been designing and building foundry conveyors since 1906.

STANDARD CONVEYOR COMPANY
General Offices: N. St. Paul 9, Minn.
Sales and Service in Principal Cities

Engineered Conveyor Systems • Portable Conveyor Units • Spiral Chutes • Pneumatic Tube Systems

Send for Standard's special catalog "Conveyors for Foundries" — a valuable reference book illustrating and describing conveyor installations in leading foundries.

Standard
GRAVITY & POWER
CONVEYORS

ENGINEERED FOR LOW-COST PRODUCTION

opening provided in the door of the furnace. The opening may consist of a 3-in. pipe nipple of ¾-in. and 1-in. size, welded into the door, at a level of 5 ft above the floor. One end of the nipple will be flush with the inside face of the door, and the other end will extend out from the outer face and should be closed with a pipe cap when not in use. The truck with this assembly should be kept in a safe place, easily accessible to the furnace room in which it is to be used. It is also well to provide a spare distributor tube assembly of hose and pipe of ½-in. for use in case the regular distributor becomes clogged with reaction products.

In case boron chloride is available but the infra-red heating assembly has not been provided, it is believed that equivalent results can be obtained by feeding a slow stream of liquid boron chloride into the furnace through the door nozzle described. The liquid chemical can easily be drawn out by simply inverting the cylinder so that the valve end is down, and then slowly opening the needle valve of this cylinder. Some experimenting will have to be done to gage the rate of flow of liquid. The same distributor nozzle as above should be used.

Use Vapor or Liquid

Such an arrangement will give less jet action than the stream of vapor under pressure produced by the lamp-heating of the cylinder. However, boron chloride can be readily injected into the furnace atmosphere in liquid phase; and its chemical effects, once it is in the zone of the fire, will be identical with that of vapor.

When it is found that a fire has started, power, fuel and SO_2 feed lines should be shut off at once, but the fan circulating furnace atmosphere should be left running. The extinguishing assembly described above is brought close to the front of the furnace and the extension cord to the infra red lamp is plugged in. The steel pipe at the end of the distributor hose is inserted through the opening in the furnace door and boron trichloride gas is turned on.

After about one minute from the time the gas feed is started the circulating fan should be shut down.

Boron trichloride flow is continued until the furnace temperature drops to about 700°F, which indicates that the fire is out. This may require gas feeding for 45 to 60 minutes.

An alternate procedure is to use boron trichloride for 5 to 10 minutes or until the light observed in the furnace peep hole has disappeared and withdraw the charge from the furnace and extinguish any remaining

RIGHT for YOU

because we use the RIGHT COAL to make New England FOUNDRY COKE

Continuous research is necessary to meet the changing requirements of modern industry.

Our new coal research laboratory

is typical of the modern facilities and resources now available to us to help produce a high quality New England Foundry Coke which will satisfy your exacting demands.

NEW ENGLAND COKE

NEW ENGLAND COKE COMPANY

Subsidiary of

Eastern Gas & Fuel Associates

250 Stuart St., Boston 16, Mass.

HUbbard 2-8400

fire with G-1 powder.

The above procedure has been described specifically for the vapor phase injection of the chemical. If the boron chloride has been applied in liquid phase, as suggested, the same steps should be taken except for the operation of the heating lamps. Inversion of the cylinder would take the place of plugging in the lamps.

While boron trichloride is not regarded as being highly toxic, it must be handled with care. Boron trichloride evolves sharp choking fumes which are difficult to breathe. It is essential, therefore, that there be adequate ventilation in the area where it is used, and that suitable gas masks be available for use if required. Liquid boron trichloride is irritating to the skin. Its vapors likewise irritate through the formation of hydrochloric acid. In the case of the experimental fire described earlier, a cloud of yellowish-brown smoke poured out when the furnace door was opened. Such smoke should not be inhaled.

Most of the information as to practice contained in this article has been obtained from the Dow Chemical Co. and the Aluminum Co. of America, whose co-operation is acknowledged with gratitude.

Engineer and the Foundry

(*Continued from page* 94)

make a profit to stay in business but he wants to know if your company operates legitimately or on a "profit at any cost" basis. He should be informed before hiring as to the company's morals. He is also interested to know if your bookkeeping methods are honest or shady.

From the foregoing material, you will gather some kind of a conception as to the kind of person a graduate engineer will be. What individual from your company should visit our campus for interviewing? Someone who will honestly answer questions regarding the graduates' acceptance into the company, any question as to company morals and ethics. He also should be able to tell the graduate what his work will be if he accepts your offer. If you tell him a little of this and a little of that, you are apt to discourage him. He probably will like a year's training program. He would also like to feel that he is the understudy for someone in your organization who is moving from supervision to the management level. The prospective engineering employee is very much interested in what you have in mind for him

pour clean aluminum

APEX 1200 ALUMINUM FLUX

Apex Flux cleanses molten aluminum alloys of oxides and non-metallic material present when remelting foundry scrap and helps dispel gases—a factor in producing sound homogeneous castings having the ultimate in mechanical and physical properties; improved machinability and polishing characteristics. No smoke or fumes, odorless, does not absorb moisture.

Immediate delivery.

Informative folder, with prices, available on request.

APEX SMELTING COMPANY

2535 WEST TAYLOR STREET • CHICAGO 12, ILL.

6702 GRANT AVENUE • CLEVELAND, OHIO

A Chronology of .... RADIUM RADIOGRAPHY

1930— First commercial use of gamma rays; radiograph made of sternpost of cruiser "Chester".

1935— First purchase of radium for industrial radiography by Westinghouse; bought from Radium Chemical Co., Inc.

1938— AFA questionnaire revealed that 8% of steel casting men used radium radiography.

1941— 22% of steel casting men bought, rented, leased or employed radium for radiographic purposes.

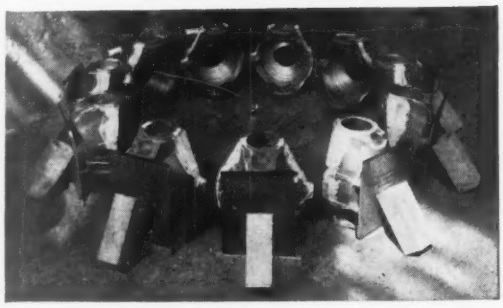
1946— 150 steel foundries rented or leased radium.

1947— American Society for Testing Materials issued Radiographic Standards for Steel Castings. (Gamma Ray). E71-47T.

1948— 200 steel foundries rented or leased radium.

1949— Revision of the U. S. Navy Universal Exposure Calculator for Radium Radiography by N. A. Kahn, E. A. Imbembo and J. Bland, New York Naval Shipyard, Brooklyn, N. Y.

1950— 250 steel foundries rented or leased radium.

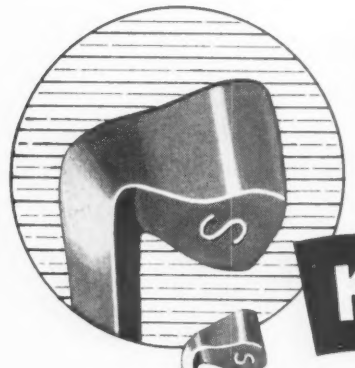


Large number of castings being radiographed simultaneously

Radium radiography has improved production of steel castings and effected economies. The apparatus is simple, requires no special training to operate, is portable, and most important, involves no capital expenditure. The apparatus may be bought, leased or rented. Investigate our claims, and write today for additional information.

RADIUM CHEMICAL CO., INC.

New York: 161 East 42nd St. Chicago: Marshall Field Annex Bldg. Los Angeles: 3723 Wilshire Blvd.



STANDARD

does it again!

The KOOLHEAD 90°

The 90° bend under the head simplifies your operation and places the chill where it belongs. The "Koolhead 90°" will perform two duties: (1) a chill and (2) holding the sand on the surface of the mold. We feature clean, bright finished Horse Nails and can furnish the new bent head in any of the various "Koolhead" types.

Write for samples and prices.

CHILL KOOLHEAD NAILS

STANDARD HORSE NAIL CORP.

Since 1872 NEW BRIGHTON, PA

Chill nails for every purpose

F-1

when a training program is completed.

It is only fair to inform him what your company expects of him not only on the company premises but in extra duties as they relate to the community. If the company management is to be perpetuated through sons and sons-in-laws, that fact should be made known at the time of interview.

Here are some comments by students after participating in many interviews this year:

"The men from the personnel departments are ineffective, for they do not have anything in common with an engineer."

"In many instances the interviewer does not know what products are manufactured by his company."

"The interviewer is unfamiliar with company practices, policies and ethics."

In words of another student they wish to be interviewed "by someone who knows what he is doing." The poorest kind of interviewer is one who gives the student the impression of "being weasel from the word go." The students seriously question if the character of the various companies is as glowing as was depicted to them by the personnel department representative.

List Graduate Qualifications

Let us now sum up the qualifications of the engineering graduate who comes to you.

1. He has gone to college to acquire a background which he believes will permit him to acquire a larger income than had he decided on going into some other field.

2. Most engineers entering the foundry industry have hopes of progressing through the supervisory ranks into management and executive status with your company.

3. He has been introduced to studies relating *to people* through courses taken in college.

4. He comes to you with the human emotional needs of being wanted and, further, he desires acceptance and approval.

5. He comes to you with definite convictions regarding business morals and ethics. He has had a professional training.

6. He comes to you hoping that what he learned during an interview with your company representative will be found as stated.

Now let us see what are some of the ways he can be of value to you.

Before entering an engineering curriculum the student has graduated from a high school. It is important to remember that the high school curriculum reflects the philosophy of

SPO

AIR VIBRATORS

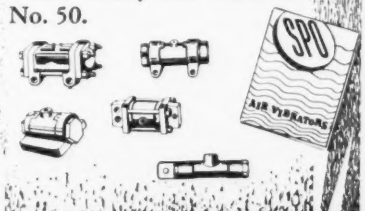
HIT HARDER
LAST LONGER
COST LESS!

Superior performance . . . maximum life . . . minimum cost . . . these features make SPO the best buy in air vibrators. You can depend upon these sturdy units to supply powerful, high-speed blows—day after day—for all your foundry vibration needs.

Key to **SPO** vibrator superiority is a special corrosion-proof bronze alloy cylinder liner which assures full-power starting, high-speed operation, low air consumption and maximum service life.

Whatever your vibration requirements, **SPO** has a model that will do the job.

For complete information, write today for Bulletin No. 50.



BLOW for BLOW . . .
You can't beat a SPO

749-SI

SPO INCORPORATED

6449 Grand Division Avenue
Cleveland 25, Ohio

the teachers and the community in which it is located. The engineering college which the student attends also has a philosophy of education peculiar to itself. Therefore it is not too difficult to predict that the background of any graduate will reflect the training of a particular high school and a particular college.

All engineering colleges try to build upon a background of varied high school curricula to provide the engineering graduates with some knowledge of the five languages of engineering, namely, mathematics, chemistry, physics, engineering drawing and English. In addition he has specialized in areas of engineering where two or more languages have been combined and is illustrated by the engineering area of metallurgy which is basically chemistry and physics. If I were employing engineers, I would be more interested in determining the candidates grasp of the engineering languages than I would be in any series of specialized courses taken in any given area.

Graduate Study Helps

Present day engineering curricula require a completion time of four years in many colleges and five years in a few colleges. It does appear that today if you are going to secure an engineer well grounded in *all* of the engineering languages, you will find it necessary to urge students to participate in graduate study programs. I believe any foundry management will find that its operations will be vastly improved when the management supports, by *active interest* and by financial assistance and reward, broad graduate study programs by its engineering personnel.

The evaluation and success of an engineer is seldom predicted from the grades received during his college training. From the number of graduates with whom I am acquainted I can state that high or low grades are of little value in assessing how well a particular engineer will contribute to the operations of a foundry or how well the engineer will serve his community. The fact that the engineer has been graduated indicates he has successfully passed through a rigorous selective educational process.

It is no secret that the foundry industry is 6000 years old and that perhaps for that long a time it has not been considered as one of the select places in which one would want to work. The public does not associate the manufacturing of castings as an engineering enterprise. It is such; but to prove the point is outside the purpose of this paper. I see no reason why you should not publicly pro-

Core Hardness

Checked in Seconds!

Patd.

with

Gordon & Campbell
CORE HARDNESS
TESTER

Why take chances with questionable cores? With this simple tester you obtain the true hardness value by measuring a definite depth of penetration of a spring-loaded abrading point. The hardness value is read direct on the graduated dial—no computation.

The Gordon-Campbell sand testing units offer the latest improvements for checking these critical properties of sand mixtures: clay content, permeability, bond strength, moisture, core hardness, and core strength. The tests are quick, and no calculations are required. They offer the simplest approach to sand control.

Write for full particulars on Gordon-Campbell sand control units. Savings in scrap losses will pay for these testing units.

All Gordon-Campbell sand testing units are designed to conform with the recommendations of the Committee on Foundry Sand Research of the American Foundrymen's Society.

FREE TO ANY FOUNDRYMAN

Write for this booklet. It explains foundry sand control and how to reduce scrap losses.

GORDON SERVICE

CLAUD S. GORDON CO.

Manufacturers & Distributors

Metallurgical Testing Machines • Industrial Furnaces & Ovens • Temperature Control Instruments • Thermocouples & Accessories

Dept. 20 • 3000 South Wallace St., Chicago 16, Ill.
Dept. 20 • 2035 Hamilton Ave., Cleveland 14, Ohio

DEPENDABLE
FORGED & GROUND
CHISELS
Hand and Pneumatic
Made to Quality—Not to Price

Will Cut
CAST ARMOR

We welcome trial orders subject to approval

BEDFORD TOOL & FORGE CO.
25 Interstate St. Bedford, Ohio

BEDCO

When You Think of ALUMINUM

THINK of S-G

Whatever your casting problem may be—die cast—permanent mold or sand cast specify S-G Aluminum Alloys. Every step in their production is checked constantly by skilled laboratory men using the most modern equipment available. Our facilities are available to help you solve your specific problems.

Trouble-free production of quality castings doesn't just happen. The skill and know-how of diecaster or foundry is of prime importance. But the most skilled of craftsmen must have the right type of ingot.

You can rely on S-G Alloys—they meet your most rigid specifications. All types and grades of de-oxidizers available.

SONKEN-GALAMBA Corporation
MEMBER ALUMINUM RESEARCH INSTITUTE
Riverview at 2nd Street · Kansas City 18, Kansas

claim in your local newspapers that you have added an engineer to your staff. Think of the boost in respect you will receive in your locality when the public realizes that your plant requires engineers. Or perhaps of greater importance, think of the assistance given to this new employee in establishing himself as a member of *his* and *your* community. It might even be that with repeated news releases, such as this, your foundry might come to be considered as one of the more progressive manufacturing plants in your community. Why should such important information be relegated to the stereo-typed financial page items?

Your company probably will employ engineering graduates for first line supervisory positions. Some colleges provide course work background to assist the graduate in meeting these requirements proposed by Murie:[4] "Direct responsibilities of front line supervision will be taken to be the following—(1) To bring about and maintain corrective changes in the mental and coexistent physical actions of the workmen under his jurisdiction. (2) To supervise the use of personal protective equipment."

Study Workers' Problems

It is important to know that the supervisor is concerned with the mental and social problems of workmen under his jurisdiction. Some colleges of engineering today teach that people are human beings and not machines and they also teach that supervisors work with and lead people rather than drive them. A supervisor must possess a philosophy embracing cooperation and sympathy, as contrasted to the age-old concept of the tyrannical foreman.

The following quotation from *Good Housekeeping*[5] illustrates the point I wish to make: "More accidents occur among workers whose foremen are autocratic than among those whose foremen are sympathetic. In one plant, the average number of accidents causing loss of time was six for each department. Two departments with autocratic foremen had 26 and 22 accidents, respectively. When the foremen were shifted to other departments, accidents increased in those departments. Anxious and frustrated workers have more accidents than those not affected."

Engineering graduates have been of great assistance in areas of casting manufacture not usually considered as engineering fields. Two examples from several will be cited.

A young engineer took a position in a maintenance department where he was associated with older rough-

and-tumble employees. It was not long before he was being consulted concerning the maintenance of electrical service. One day the electrical crew in an emergency was about to cross some lines and would have done so had not the engineer pointed out that they would cause a power failure in the entire foundry. Due to his training he was able to propose a simple move to remedy the immediate trouble. From then on the young engineer found himself called out of bed at all hours of the night for advice on what to do next.

The second case involved a customer who specified that a certain sampling plan be used for casting acceptance. The foundry accepted the order and the sampling plan, something they did not understand. Only one of the 12 engineers in the foundry organization had background necessary to evaluate sampling plans and he was busy on another assignment. Somehow he became aware of the accepted sampling plan and upon examination he determined that the foundry could not ship under the terms of the plan, and the customer had no protection. The customer admitted he had obtained this plan from the supplier of another product and did not understand it but it sounded modern. With the aid of this engineer a sampling plan was devised which proved very satisfactory to customer and manufacturer.

Class Room Training

It is hoped that these two examples will indicate that engineers can be of great value in many phases of casting production. It is also doubtful that just because one has an engineering background that he can adequately serve where special talents are required. Much can be accomplished by individual study after hours but this is hardly a substitute for formal classroom training under a competent instructor.

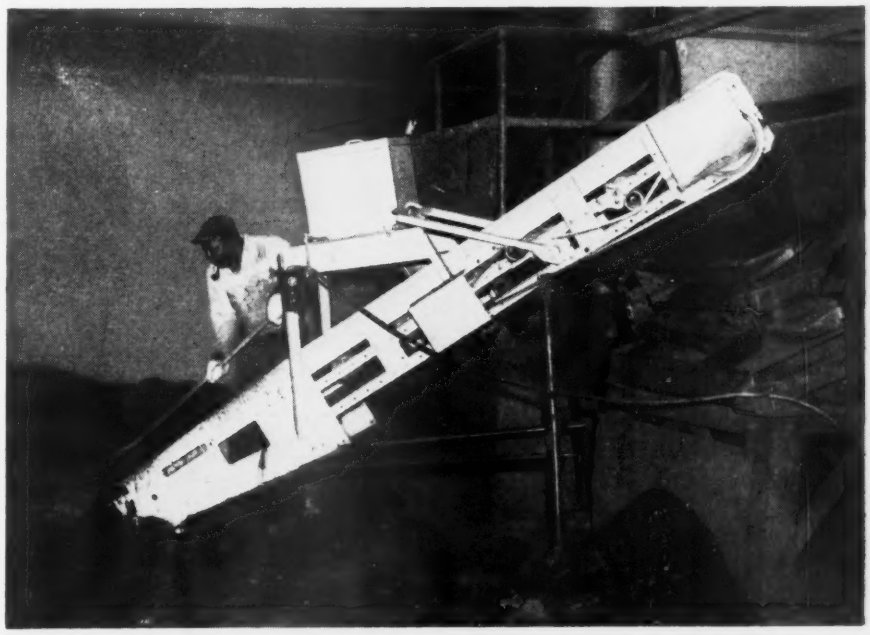
You are going to need someone who can speak for your company from the public platform where your company's basic economical and social morals, ethics and practices are certainly being questioned today by many people. Even your own employees, being people, are questioning your practices. Harvey B. Jordan[6] stated, "Most significant discussion of public questions takes place in situations where differing points of view are represented. This requires men who can think on their feet, speak extemporaneously, and counter arguments as they are presented. We need spokesmen who can hold their own—and more—in give and take discussion and rough-tumble debate. The speak-

(*Continued on page* 265)

One in a series of factual reports from owners of Farquhar Conveyors

FARQUHAR CONVEYOR TURNS DIFFICULT JOB INTO PART-TIME WORK*

* at Fairview Foundry, Poughkeepsie, N. Y.



FAIRVIEW FOUNDRY accumulates sand returned from the foundry floor, together with fresh sand, in piles prior to delivery to the Muller. Formerly, three workmen were required, using long-handled shovels, to throw the sand from the floor onto the screen of the Muller. To speed up this operation, Fairview installed a Farquhar Conveyor. Now, the entire job is handled by just one or two men, on a part-time basis!

Whether you move coal, gravel, sand, aggregates, cartons, boxes, bundles, bales, or any kind of bulk or packaged materials—horizontally or from floor to floor—Farquhar can cut your handling costs to rock bottom! One or more of the complete line of Farquhar portable, semi-permanent, and permanent conveyors will solve your handling problem. Our engineers will be glad to consult with you . . . at no obligation!

Farquhar CONVEYORS SAVE YOU MONEY

FREE! "Owners Report" . . . a booklet of case histories of money-saving conveyor installations.

Write for your copy today: A. B. FARQUHAR CO., *Conveyor Dept. G-45,* 142 N. Duke St., York, Pa., or 618 W. Elm St., Chicago 10, Ill.

WORLD'S MOST COMPLETE CONVEYOR LINE

A. B. FARQUHAR COMPANY Division of THE OLIVER CORPORATION

Republic Rubber Packing catches pellets that wear out iron

The rotating table of this Roto-Blast machine moves through a tunnel of storm where high-speed impellers hurl down a rain of metal pellets that knock rough edges off new-made castings.

The table top is made of a special alloy, cast hard and tough. But without protection it can't very long resist the stinging fury of the metal hailstones.

The answer is Republic Rubber Sheet Packing . . . a special, soft, perforated, 7/16-inch-thick pad of solid Republic Rubber Packing that catches the pellets and protects the table top from impact at the storm center . . . and a cloth-insert rubber-surfaced curtain that confines the ricocheting pellets to the blast area and thereby protects workmen against eye and other injuries.

Large foundries and machine companies use Republic Rubber Packing on both these jobs of protecting workmen and machines. They use Republic Packing because it lasts longer, is easier to handle and because it's supplied through local Republic Distributors who give fast, expert service.

Republic's Rubber Packing, supplied in all standard gauges in rolls or sheets, has a thousand and one industrial applications that you should know about . . . diaphragms, gaskets, cushion blocks, vibration dampeners, sealers, trough containers, protective shields, silencers . . . these are only a few of the many uses for economy-wise Republic Rubber Packing, **made of material that outwears steel.**

Republic Rubber Packing is in stock at your local Republic Distributor. Ask him about it today or write direct for complete information.

INDUSTRIAL RUBBER PRODUCTS BY

REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation

YOUNGSTOWN, OHIO

(*Continued from page* 263)

ing skills required include competence in analysis, the ability to appraise evidence and argument, to expose fallacies, and to compose language readily and easily."

Mr. Jordan continues: "A minimum program of education and training for the kind of public discussion I am talking about should include: (1) a broad understanding of social, political and economic issues in American life and culture; (2) a clear insight into personal and social values as they affect these issues and (3) specific training in the philosophy and method of democratic participation."

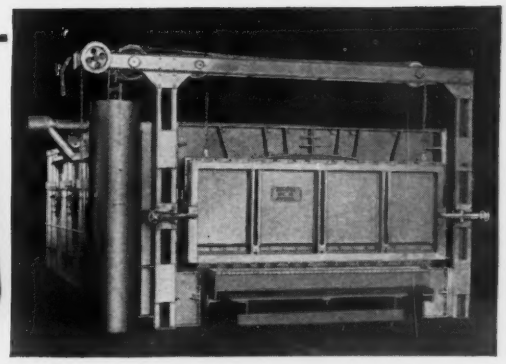
It is doubtful if a graduate engineer will come to you with the minimum training specified by Mr. Jordan. A few universities are trying to provide such a background. Why not take advantage of your local universities in furthering the training of these newly acquired graduates as well as selected additional personnel?

Require Further Training

The language behavior of your employees is indicative and sometimes equivalent to their thinking behavior. The graduate engineer will possess some competence in analysis and appraisal of evidence and argument due to his regular engineering training. His ability to compose language readily and easily can be justly questioned. And how about the rest of us—are we so good in this respect? The graduate engineer has a better chance to succeed after receiving further training.

As you are aware, the Foundry Educational Foundation, under the direction of its very able executive director, George Dreher, has made great strides in making the foundry industry aware that the manufacturing of castings is an engineering enterprise. Right here I would like to voice an opinion that a foundry is much more than a metallurgical engineering endeavor. The foundry needs engineers for production control, safety engineering, design, material handling, plant layout engineering supervision, control and knowledge of materials as well as metallurgical control.

The FEF has also made the universities aware of the industry and that it needs engineers because it is an engineering enterprise. No glory is to be taken away from the older molders and artisans who taught foundry in our schools. If you think those fellows were not appreciated you should visit a campus during reunion time. One of the first persons sought out by a returning alumnus is the foundry instructor. Where do



FOR NORMALIZING ANNEALING AND ALL HEAT TREATMENT OF CASTINGS

JOHNSTON CAR BOTTOM FURNACES

You'll get clean heating, high efficiency, and fuel economy in the Johnston furnaces. Engineering experience is also apparent in their smooth mechanical operation—in their roller bearings in car and door hoist shafts, and power operated car pullers. Write today for bulletin F-240.

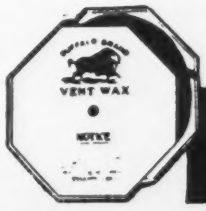
JOHNSTON EQUIPMENT FOR THE FOUNDRY
• MELTING FURNACES • HEATING TORCHES • LADLE HEATERS
• HEAT TREATING FURNACES • BURNERS, BLOWERS, CONTROLLERS
OVER THIRTY YEARS EXPERIENCE IN DESIGN AND MANUFACTURE.

SAFETY THE JOHNSTON LINE DEPENDABILITY
JOHNSTON MANUFACTURING CO.
2825 EAST HENNEPIN AVE.
MINNEAPOLIS 13, MINN.
ENGINEERS & MANUFACTURERS OF INDUSTRIAL HEATING EQUIPMENT

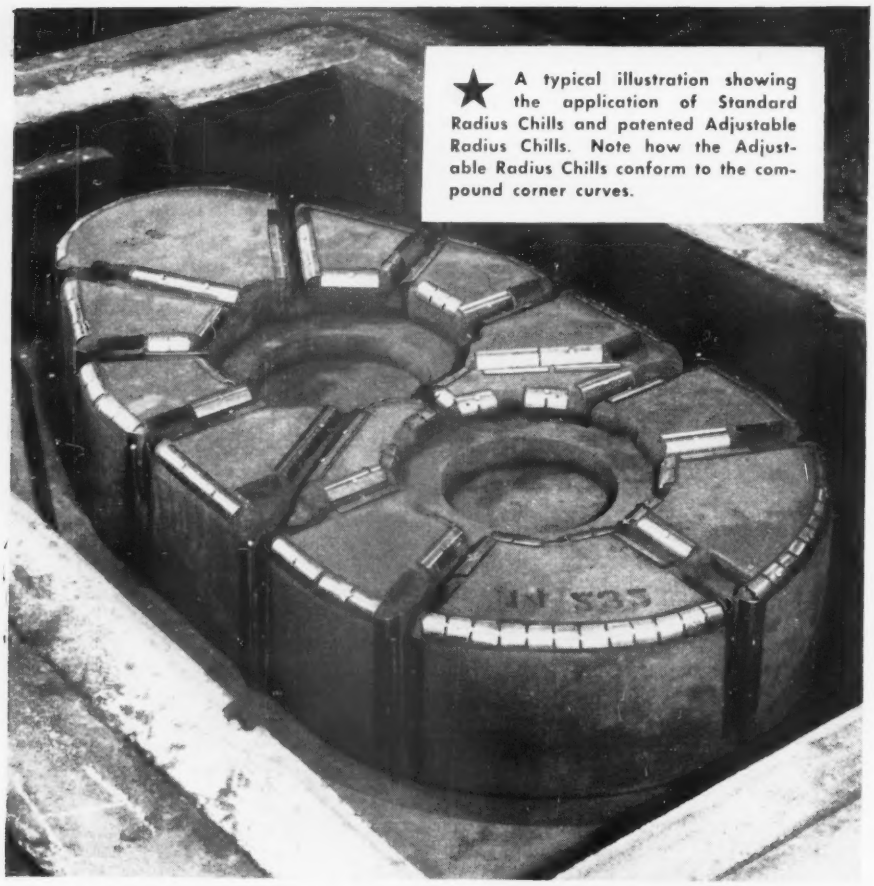
TAKE THE PRESSURE OFF WITH

BUFFALO BRAND VENT WAX

Here's the foundry-proven way to prevent casting losses due to improper venting. Low cost, dependable Buffalo Brand Vent Wax takes the pressure off . . . saves castings. Two shapes—18 sizes. Write for sample now!



UNITED COMPOUND CO.
328 SOUTH PARK AVE., BUFFALO, N. Y.


A typical illustration showing the application of Standard Radius Chills and patented Adjustable Radius Chills. Note how the Adjustable Radius Chills conform to the compound corner curves.

ASK FOR

Milwaukee

RADIUS

CHILLS

Straight Section or Adjustable

Milwaukee straight section Radius Chills have been used to considerable advantage on straight fillets and edges in many leading steel foundries. The new patented Adjustable Radius Chills, with equally spaced slots so that sections may be cut off in one inch segments, fulfill the need where chills are necessary along the fillets of cylindrical, round, or irregularly shaped castings. These Adjustable Chills have effected substantial savings in welding and cleaning costs.

WRITE FOR SAMPLES AND PRICES

Milwaukee Chaplet & Mfg. Co.

1025 SOUTH 40th STREET • MILWAUKEE 4, WISCONSIN

you think the FEF program would be today if it were not for their love for what they were teaching? If they did nothing else they kept alive the necessity of foundry instruction while pattern-making and machine tool practice has disappeared from several campuses.

Replacement personnel at universities for foundry instruction no longer comes from the trade. Even an engineering graduate with a bachelor's degree will find it difficult to obtain a teaching position. Replacements today are going to instructors who hold the doctor of philosophy degree or to those who are striving toward such a degree. To the best of my knowledge this had occurred at the University of Michigan, Michigan State College, Pennsylvania State College, Lehigh University, Massachusetts Institute of Technology, Illinois Institute of Technology and Ohio State University. The upgrading in the level of foundry engineering instruction is due largely to the influence of the FEF. Your foundry operations cannot help but benefit from the continuing foundation program.

I have tried to present to you the fact that an engineering graduate is a *human being* and is subject to all the care and feeding necessary to permit him to blossom out as a servant to your company and community. If he is nurtured by a sympathetic management he will stay with you. Most of them thrive on responsibility so pass it out fast as he has the capacity to learn quickly. He is a professional individual.

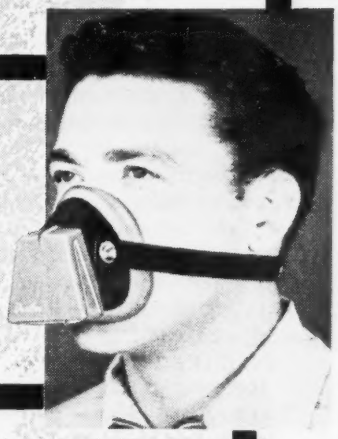
References

1. "The Engineer as a Manager," *Mechanical Engineering*, April, 1950.
2. L. C. Monin, "Liberalizing Studies in the Curriculum of Engineering Courses," *McGraw-Hill Book Notes*, October, 1924, p. 3.
3. *Teenagers—Their Days and Ways*, p. 10. National Council of the Churches of Christ in the United States of America.
4. K. L. Murie, "Industrial Accident Prevention Problems on the Direct Supervisory Level," master's thesis, Ohio State University, 1952.
5. *Good Housekeeping*, p. 39, March, 1952.
6. Harvey B. Jordan, "Silence Is Not Always Golden." Address delivered at the Cleveland Regional Meeting, American Iron and Steel Institute, 1951.

Guidebook Outlines Management Sessions

American Management Association, New York, has published a guidebook for management development containing digests of talks presented at a management briefing session May 27-28 at Hotel Astor, New York. Purpose of the session was to help crystallize and define progress made in the techniques of management development, and the guidebook summarizes some of the basic concepts of these techniques as practiced by many American businesses today.

GO ALL OUT
AGAINST
DUST
DANGERS!



McDonald
dustfoe
#55
RESPIRATOR
USBM APPROVAL #2166
FOR DUST

Going half-way in dust protection isn't far enough — go all the way with Dustfoe #55! This lighter, smaller McDonald Respirator is the best you can get for comfort and safety — unlimited! Exclusive "Static-Web" disposable filter holds dust positively by electrostatic force — is narrower to insure full vision on close work! Other features: *counter-gravity air flow . . . low maintenance . . . easier breathing!*

1932-1952
20 YEARS OF PROGRESS

B-F-McDonald
COMPANY
Manufacturers & Distributors of
Industrial Safety Clothing & Equipment

Safety FOR HEAD TO FOOT

5721 West 96th St., Los Angeles 45
Other Offices in San Francisco and Houston

Departmental Teamwork

(*Continued from page* 101)

ness of castings, dimensional accuracy, etc. Most jobs are single plate. The riser systems are perhaps unique. The runner bar is designed and proportioned to serve as the riser system. As long as the volume to area (V/A) relationship is correct, and the ingresses keep open, it has been found that riser height is of no discernible advantage. The volume is the factor, and that in the drag serves as well as that in the cope in helping directional solidification and soundness of the casting.

Present gating procedures are practical applications of research carried on over many years. This earlier "theoretical" work involved studies of the mechanics of solidification of various alloys, temperature gradients in casting and gating systems, crystallization characteristics, etc. One among many practical considerations is that the ingress should be regarded as a thermal valve—a point often overlooked in gating many metals. Lunkenheimer ascertained that choice of proper sand, and rigid foundry controls of uniformity and of molding conditions enabled use of a maximum number of patterns on the plate. Of course, this involves the problem of uniform ramming and proper sand flowability. In some cases, special squeeze boards containing projection over the deeper recesses proved useful.

For a number of years the firm followed the common practice of setting molds out on racks on the floor. Increasing demand for much greater production necessitated a change since all available space was being used. Area could not be expanded due to the fact that the foundry was located on the top floor of a five-story building. After careful consideration, the co-operating representatives decided on installation of the simplest possible mechanization. This consists of 16 molding stations with overhead sand hoppers and roller conveyors for mold set-out and flask return, overhead sand system, and mulling equipment.

Molding and core sands are received in railroad cars and transferred into a building near one end of the foundry. The sand is elevated above the tracks into and across to the foundry building, and then up to 80-ton storage tanks on the roof. Sand from the storage tanks drops through chutes to mixing equipment located on the fourth floor. Mixing equipment includes two 2000-lb and one 1000-lb capacity mullers. The conditioned sand is carried on a belt to the opposite end of the building

New XL BOND
FOR CARBIDE TOOL AND CUTTER
Grinding

EFFICIENT ECONOMICAL
ROUGH GRINDING AND FINISH GRINDING
NEAREST THING WE KNOW TO A DIAMOND WHEEL
FOR PRECISION AND OFFHAND GRINDING

Another
Chicago Wheel
FIRST

"XL" is Chicago Wheel's exclusive new bond for silicon carbide vitrified grinding wheels, especially made for grinding carbide cutting tools. Supplied in most popular sizes and steel backs. Prompt delivery. Keep your production up . . . costs down, with "XL."

AVAILABLE NOW
FOR
PROMPT DELIVERY

Offices in principal industrial centers
Write for Free Information

CHICAGO WHEEL
& Mfg. Co.

Dept. F. 1101 W. Monroe St., Chicago 7

Brinell Testing

→ at production line speeds! →

This direct reading Brinell hardness tester tests round or flat parts *fast*. No grinding of parts is necessary and the operator simply notes that the dial indicator needle falls between pre-set tolerance hands.

Hydraulically applied standard Brinell test loads are used. Foot control allows operator to test parts as quickly as he can move them through the machine.

Write for more information on all our Brinell testing machines.

DETROIT TESTING MACHINE COMPANY

9390 Grinnell Ave., Detroit 13, Mich.

finer **SANDS**

. . . for precision castings

- Wedron can give you fine grain, carefully screened sand for new developments in shell mold casting. Rounded grain sand particularly suitable for use in core blowing machines. Greatly reduces cutting out of core boxes.
- Also special ground sand (flour) for use with lost-wax casting method.

Rigid control of screening assures sands to meet every casting need.

MINES AND MILLS IN THE OTTAWA-WEDRON DISTRICT

WEDRON SILICA COMPANY

38 SOUTH DEARBORN STREET, CHICAGO 3, ILLINOIS

where it is elevated to the fifth floor and discharged onto another belt traveling in the opposite direction over the storage hoppers at the molding stations.

The sand turnover is about three times per day. Molding stations are located in a row along one side of the foundry, with a 6-ft aisle between machines and the wall of the building. Each station is equipped with two roller conveyors about 75 ft long which extends from the molding machine toward the opposite wall. Conveyors are mounted about 18 in. above the floor level, and are used for setting out the molds. A common return roller conveyor for flasks and bottom boards is located between each two machines. Molds are shaken out or dumped on openings in the floor at the end of each conveyor. Castings and sand drop onto a conveyor belt which carries them to a vibrating shakeout which separates sand and castings.

Sand is returned by conveyor belts to the sand storage bins on the roof. Castings are cleaned in airless blast units, gates and risers are removed by sawing or cutting, the gate stubs ground off, and the castings are inspected. They then are forwarded to the machining department for such operations as needed. Castings then are inspected, tested under hydraulic pressure and assembled into product, and again pressure tested to see that they meet requirements.

Alloys are melted in several types of units, including low-frequency electric induction, open-flame barrel type and reverberatory or hearth furnaces. Melting cycle in the low-frequency induction unit, used mainly for silicon bronze, is controlled by the metal temperature. In the reverberatory furnaces, used for bronzes, and the gas-fired barrel furnaces, used for high-nickel content alloys, the gas-air ratio is fixed on the basis of Orsat gas analyses of the furnace atmosphere to provide neutral or slightly oxidizing conditions. Settings are held by proportioning burners. The melters are not allowed to set the burners.

Maximum metal temperatures in the furnaces are controlled to definite values depending upon the particular alloy. Melting cycles in the furnaces must be synchronized with molding so that when the alloy has reached the desired temperature, it can be tapped and poured as rapidly as possible. At the pouring stations the alloy temperature again is checked. If satisfactory, the alloy is poured into the molds. Otherwise, it is held until the temperature drops to the desired point.

As previously indicated, the molder receives a job ticket with the pattern

which contains instructions on molding method. It also gives data on the alloy and pouring temperature. As the molder puts the finished mold on the conveyor, he places on it an easily seen flag or indicator which shows the alloy number and pouring temperature. This eliminates the possibility of the pouring crew making errors.

An additional control is maintained by the melting room foreman, who takes a poured mold every hour from one of the lines, shakes out the castings, has them shotblasted and then carefully inspects them to see that the melting operation is being performed properly. Molding machines are checked frequently to see that they function correctly. The flasks are checked regularly to see that they retain the proper shape.

It should be pointed out that the control of all phases of molding and melting holds losses down to approximately 2 per cent by dollar value. Dollar value is determined by the direct and overhead costs involved up to the point where the casting is discarded. For example, castings discarded in the cleaning room do not involve the dollars' loss involved when a machined casting must be scrapped.

Soundness Requirements High

Perhaps unfortunately for the industry, there are no sound bases for comparing losses in various foundries. Nature of product and rigidity of inspection differ greatly from shop to shop.

Pressure castings must meet standards of soundness rarely required for structural castings. Valve castings for industrial applications such as those made by Lunkenheimer, are subjected to more severe operating conditions (in respect to both temperature and pressure) than those for domestic applications.

Attainment and maintenance of quality is a never ending job. Wherever possible Lunkenheimer has utilized instrumentation, control tests, and standardization to keep variables out of its nonferrous foundry operations. Although its cast products are quite varied, basic operations have been simplified in high degree. That any step or operation may be standardized does not mean that it is "frozen." Study and development is a constantly pursued practice.

Thanks are given Stanley Hess, Fairmount works manager, Jacob Miller, bronze foundry foreman, and Sylvester Weigand, research metallurgist, for their courtesies and help in attainment of much of the information herein, and to Paul M. Arnall, president, for permission to publish this material.

Quality
INGOT METALS
WMC

BRASS • BRONZE • ALUMINUM • AND SPECIAL ALLOYS

In the present mobilization period foundrymen and smelters find themselves depending on each other more than ever. They need each other's business, and the nation needs the business of both. Buyers' markets and sellers' markets can't endure; we know that. We also know that the best way to insure future trade is to satisfy the customer. We of the WESTERN METAL COMPANY believe in supplying ingots that are clean, uniform and up to specified standards. We invite you to write for Bulletin "F", a complete summary of tables including A.S.T.M., U. S. Federal, U. S. Navy and SAE Specifications.

WESTERN METAL COMPANY
3201 SOUTH KEDZIE AVE. CHICAGO 23, ILLINOIS
SMELTERS AND REFINERS OF BRASS AND ALUMINUM INGOTS

FOSECO FEEDEX

Exothermic Feeding Compound for Better Castings

Here's Proof!

THIS CASTING WAS MADE WITH A FEEDEX SLEEVE

— note small residual feeding head and sound casting

THIS CASTING WAS MADE WITHOUT FEEDEX

— note incomplete feeding from same size riser as used in the Feedex casting

FOSECO FEEDEX is a moldable heat producing compound for automatic feeding. Mix with water, mold into desired shape, bake dry, and insert in mold. A FEEDEX sleeve will keep risers liquid until the casting solidifies. You get a casting free of shrinkage at lower cost – smaller risers, larger yields.

MAKE YOUR OWN TEST!

Write today for a 100 pound trial order and complete information.

FOSECO FEEDEX #3 – for iron and steel
FOSECO FEEDEX #4 – for non-ferrous alloys

If you have a special problem, tell us about it – we'll be glad to be of help.

FOUNDRY SERVICES, Inc.
280 Madison Ave., Dept. F
New York 16, N. Y.

...TRADE PUBLICATIONS...

For More Details on these Items Use Reply Card—Page 237

SAND MULLING: National Engineering Co., 608 Machinery Hall Bldg., Chicago 6—Bulletin, "The Man at the Muller," presents, in layman's language, technical information on the proper preparation of molding and core sands of all types. Booklet was prepared by a committee of Northern California Chapter of the AFS.

For More Details Circle No. 90—Page 237

HYDRAULIC FLUID: Monsanto Chemical Co., 1700 South Second St., St. Louis 4—Booklet describes properties and performance of a nonflammable hydraulic fluid developed primarily for use in such equipment as die casting machines, hydraulic presses and other operations where a flammable pressure transfer fluid is a hazard.

For More Details Circle No. 91—Page 237

CUPOLA TUYERES: Sprow Tuyere Co., P. O. Box 109, Jackson, O.—Folder describes claimed advantages of double auger cupola tuyeres which give a boring action to the blast, permitting it to penetrate the stock to the center of the cupola, thus creating highest cupola temperature in an area where it will be most efficient for melting iron.

For More Details Circle No. 92—Page 237

FURNACE CONTROL: Minneapolis-Honeywell Regulator Co., Brown Instruments Division, Wayne & Windrim Aves., Station 40, Philadelphia 44—Instrumentation data sheet 4.3-4 deals with control of fuel-air ratio in metallurgical furnaces. The systems presented cover metered control systems for both single and dual-fuel furnaces.

For More Details Circle No. 93—Page 237

FLOOR TREATMENT: Wilbur & Williams Co., 130 Lincoln St., Brighton 35, Mass.—Folder analyzes industrial floor problems and suggests a walkway surface that offers high resistance to slipping under a wide variety of service conditions. This is a brush-applied coating to wood, concrete, or mastic floors.

For More Details Circle No. 94—Page 237

HEAT TREATING: Surface Combustion Corp., Toledo 1, O.—Bulletin SC-156, on direct fuel-fired furnaces for all types of heat treat processing, gives practical applications of batch and continuous furnace designs in the ferrous and nonferrous industries, plus basic operating data for each typical example.

For More Details Circle No. 95—Page 237

LUBRICANTS — CLEANERS: E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33—Folder, describing four die casting lubricants, suggests proper dilutions and application of these heat-resisting lubricants for various types of zinc and aluminum die casting operations. A second folder on metal cleaning lists recommended uses of the company's alkaline, emulsion, acid phosphate and surface active agent type cleaners.

For More Details Circle No. 96—Page 237

SURFACE HARDENING: Lindberg Steel Treating Co., 222 North Laflin, Chicago 7—Booklet describes the Malcomizing process for surface hardening stainless steels. Besides telling what the process is, what it does and how it works, the booklet outlines various company experiences with its use.

For More Details Circle No. 97—Page 237

LIGHTING: General Electric Co., Inquiry Bureau, Nela Park, Cleveland 12—Bulletins 6 and 7 in a series of publications dedicated to promoting better lighting, and thus improved production, in industrial plants show examples of proper lighting in various shops and describe systematic lighting maintenance.

For More Details Circle No. 98—Page 237

WELDING ELECTRODE: Eutectic Welding Alloys Corp., Dept. P, 172nd St. & Northern Blvd., Flushing 58, N. Y.—Leaflet TIS 991 features applications of a new noncritical (no nickel) electrode for welding iron or iron to steel. Included are technical data on applications and physical properties.

For More Details Circle No. 99—Page 237

BEARING MAINTENANCE: Anti-Friction Bearing Distributors Association, 1900 Euclid Ave., Cleveland 15—"AFBDA Bearing Maintenance Report" deals with maintenance problems of antifriction bearings. Proper installation, maintenance, and lubrication methods are detailed in illustrated leaflets.

For More Details Circle No. 100—Page 237

PHOSPHOR COPPER: Ajax Metal Division, H. Kramer & Co., Frankford Ave & Richmond St., Philadelphia 23—Booklet on how to use phosphor copper as a deoxidizer and hardener for bronze and brass alloys tells what the material is, why it is used, and illustrates and describes the proper method for using it.

For More Details Circle No. 101—Page 237

MOTORS: Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee—Bulletin 51B7149B describes totally enclosed, fan-cooled motors with tube-type, air-to-air heat exchangers in ratings from 40 hp to 600 rpm through 800 hp at 3600 rpm, available in standard and explosion-proof designs.

For More Details Circle No. 102—Page 237

MAGNETIC PULLEYS: Magnetic Engineering & Mfg. Co., Clifton, N. J.—Catalog 152 describes claimed advantages of the company's permanent

magnet pulleys. It includes a chart of weights, capacities and dimensions for various size pulleys and a table and formula for determining the correct size for the kind and volume of material to be handled and the type of separation required.

For More Details Circle No. 103—Page 237

OSCILLATING CONVEYORS: Link-Belt Co., 307 North Michigan Ave., Chicago 1—Book 2444 on positive action oscillating conveyors for conveying, feeding, cooling and screening loose bulk materials includes dimensions, weights, and capacity and horsepower charts for heavy and light duty models. Book shows the handling of shakeout sand, hot castings and other materials.

For More Details Circle No. 104—Page 237

SALT BATH FURNACES: A. F. Holden Co., 460 Grand Ave., New Haven 11, Conn.—Bulletin on carburizing and tempering baths contains charts showing relative case penetrations at various times and heats, amount of salt to be added each 8-hr period to balance bath and maintain operating efficiency and instructions for controlling distortion to less than 0.001-in.

For More Details Circle No. 105—Page 237

BELTING: Graton & Knight Co., 356 Franklin St., Worcester 4, Mass.—Catalog 101 on leather power transmission belting shows grades and types and contains helpful information on how to choose the proper belt for various conditions, how to get longer life from belting, how to make a belt endless, and other data of interest to maintenance men and engineers.

For More Details Circle No. 106—Page 237

BLAST CABINETS: American Wheelabrator & Equipment Corp., 505 South Byrkit St., Mishawaka, Ind.—Catalog 31-A shows company's airblast cabinets in various sizes suited for cleaning small lots of work that can be manipulated by hand and the production of which is not large enough to justify more extensive cleaning facilities.

For More Details Circle No. 107—Page 237

BIN-LEVEL SWITCHES: Stephens-Adamson Mfg. Co., Aurora, Ill.—Bulletin 11-0 illustrates and describes the company's line of automatic bin-level control switches recently supplemented by the addition of heavy duty and explosion-proof units.

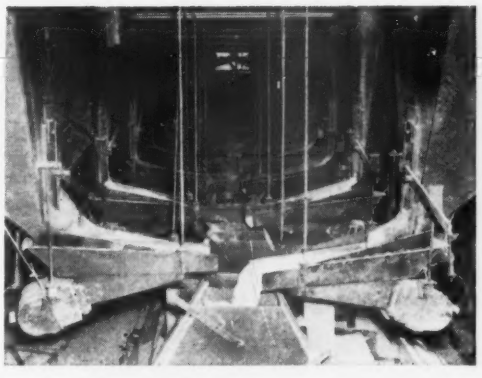
For More Details Circle No. 108—Page 237

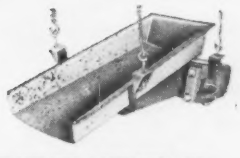
FANS: Chelsea Fan & Blower Co., Plainfield, N. J.—Illustrated catalog contains specifications, dimensions, installation diagrams and information on proper selection and installation of fans for industrial, commercial and residential requirements.

For More Details Circle No. 109—Page 237

CUPOLA OPERATION: Linde Air Products Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17—Reprint, "Improving Cupola Operation with Oxy-

Fill Your Need For Controlled Feeding with SYNTRON "Vibra-Flow"





VIBRATORY FEEDERS

With Variable Control of Rate of Flow

Write Today For FREE Catalog Folder SYNTRON VIBRATORY FEEDERS

. . . will cut the cost of your operations—handle most types of bulk materials — fine, lumpy, abrasive, hot, cold, dry, damp—capacities of up to hundreds of tons per hour at instantly controllable rates of material flow—increase the capacity and efficiency of your production.

SYNTRON COMPANY

540 Lexington Avenue Homer City, Penna.

SEMET-SOLVAY FOUNDRY COKE

In trouble?—Semet-Solvay metallurgists are practical foundrymen who will always be glad to help with your melting problems. Take advantage of their broad experience and get the most out of your Semet-Solvay coke.

SEMET-SOLVAY DIVISION

Allied Chemical & Dye Corporation

CINCINNATI • DETROIT

BUFFALO • CLEVELAND

In Canada: SEMET-SOLVAY COMPANY, LTD., TORONTO

for Better Melting

you can rely on NATIONAL BENTONITE

Baroid Sales Division • National Lead Company

BENTONITE SALES OFFICE: RAILWAY EXCHANGE BLDG. • CHICAGO 4, ILL.

These approved **DISTRIBUTORS** will give you quick service.

AMERICAN CYANAMID CO.
New York, New York

AMERICAN STEEL & SUPPLY Co.,
332 South Michigan Avenue, Chicago 4, Illinois

THE ASBURY GRAPHITE MILLS, INC.
Asbury, New Jersey

BARADA & PAGE, INC.
Kansas City, Missouri
(main office)
Also—(Branches)
Tulsa, Okla.
Oklahoma City, Okla.
Wichita, Kansas
Dallas, Texas
Houston, Texas
New Orleans, La.

G. W. BRYANT CORE SANDS, INC.
McConnellsville, New York

LLOYD H. CANFIELD FOUNDRY SUPPLIES
Kansas City, Kans.

COMBINED SUPPLY AND EQUIPMENT CO.
Buffalo 7, N. Y.

THE FOUNDRIES MATERIALS CO.
Coldwater, Mich. Also (branch) Detroit, Mich.

FOUNDRY SERVICE CO.
North Birmingham, Ala.

JAMES R. HEWITT
Houston, Texas

INTERSTATE SUPPLY & EQUIPMENT CO.
Milwaukee 4, Wis.

INDEPENDENT FOUNDRY SUPPLY CO.
6463 East Canning Street
Los Angeles, Calif.

INDUSTRIAL SUPPLY CO.
San Francisco, California

KLEIN-FARRIS CO., INC.
Boston, Massachusetts
New York—Hartford, Conn.

LA GRAND INDUSTRIAL SUPPLY CO.
Portland, Oregon

MARTHENS COMPANY
Moline, Illinois

CARL F. MILLER & CO.
Seattle, Washington

PENNSYLVANIA FOUNDRY SUPPLY & SAND CO.
Philadelphia, Pennsylvania

REFRACTORY PRODUCTS CO.
Evanston, Illinois

ROBBINS & BOHR
Chattanooga, Tennessee

SMITH-SHARPE COMPANY
Minneapolis, Minnesota

STEELMAN SALES CO.
Chicago, Illinois

STROLLER CHEMICAL CO.
Akron, Ohio

WEHENN ABRASIVE CO.
Chicago, Illinois

WESTERN MATERIALS CO.
Chicago, Illinois

MR. WALTER A. ZEIS
Webster Groves, Missouri

gen-Enriched Blast," from FOUNDRY, September, 1951, tells how oxygen, injected into the cupola air blast, causes a rapid increase in iron temperature and melting rate. A second article in the reprint, "Oxygen in Steel-Making Furnaces," describes how oxygen speeds up carburization in open hearth and electric furnaces while steel quality is maintained or improved.

For More Details Circle No. 110—Page 237

DUST CONTROL: American Air Filter Co., 266 Central Ave., Louisville 8—Bulletin 270-El features engineering data on dust control systems for metalworking industries. It illustrates and discusses exhaust hood design for many operations. Included are tables of exhaust requirements plus information on dust concentrations, weights of collected materials and other engineering data.

For More Details Circle No. 111—Page 237

TEMPERATURE INDICATOR: Tempil Corp., 11 West 25th St., New York 11—Instruction sheet covers use of temperature indicating crayons in a variety of industrial and research applications. Their use under special environmental conditions is discussed and a number of ingenious procedures and techniques for determining temperatures in unusual applications are described.

For More Details Circle No. 112—Page 237

DUST CONTROL: Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.—Bulletin 909A features dust control equipment utilizing cloth type filters. Specifications on equipment sizes and dimensions are listed as well as construction details. Application and engineering data are tabulated according to types of dust, and collection requirements. Installations are illustrated and described.

For More Details Circle No. 113—Page 237

ROOF COATING: Paramount Industrial Products Co., University Center Station, Cleveland 6—Bulletin L-4925, covering asbestos-aluminum roof coating, describes how application of the coating to roofs can reduce inside temperatures and increase roof life. Additional company aluminum paints for use in other applications also are described.

For More Details Circle No. 114—Page 237

SHELL MOLDING: Bakelite Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17—Series of data sheets describe a silicone pattern release agent, sand wetting agent and six different two-step resins. Also offered are sheets covering liquid and powdered urea bonding resins and liquid phenolic bonding resins for sand cores.

For More Details Circle No. 115—Page 237

ALUMINUM ALLOYS: Apex Smelting Co., 2537 West Taylor St., Chicago—Folder covers composition, typical mechanical properties, heat treatments, and basic foundry applications of the standard aluminum al-

loys produced by the company. Each alloy is cross referenced to ASTM, SAE and Alcoa designations of alloys with similar composition and mechanical properties.

For More Details Circle No. 116—Page 237

CONTROLLERS: Foxboro Co., 26 Neponset Ave., Foxboro, Mass.—Bulletin 461, describing controllers used in industrial process applications, contains specifications, controller air connections, case dimensions, measuring elements, safety shutdown systems and other features.

For More Details Circle No. 117—Page 237

FURNACES: Lindberg Engineering Co., 2450 West Hubbard St., Chicago 12—Bulletin 560 covers stationary and tilting type two-chamber melting furnaces. A rating capacity-dimension table and a listing of typical applications are included.

For More Details Circle No. 118—Page 237

STEEL FLASKS: Pressed Steel Flasks Inc., Eaton Rapids, Mich.—Illustrated catalog 452 provides specifications on the company's line of flasks, trunnions and clamps, pin lugs and handles, pins and bushings, and allied equipment.

For More Details Circle No. 119—Page 237

BATTERY CHARGERS: Electric Products Co., 1725 Clarkstone Rd., Cleveland 12 — Bulletin 10-210 describes and illustrates company's full line of single circuit motor generator battery chargers for industrial batteries.

For More Details Circle No. 120—Page 237

SAFETY RULES: Westinghouse Electric Corp., 306 Fourth Ave., Pittsburgh 39—Section 27 of "Westinghouse Hints on Electrical Maintenance" deals with safety rules for electrical maintenance and construction workers.

For More Details Circle No. 121—Page 237

AIR CLEANER: Logan Engineering Co., Aridifier Division, 4913 West Lawrence Ave., Chicago 30—Illustrated catalog 252 describes a mechanical device said to remove 92 per cent of oil, moisture and dirt from compressed air and gas lines.

For More Details Circle No. 122—Page 237

BURNISHING POWDER: Blue Magic Chemical Specialties Co., 2135 Margaret St., Philadlephia 24—Bulletin 11 describes a burnishing powder for use in finishing copper, brass and bronze castings in tumbling barrels.

For More Details Circle No. 123—Page 237

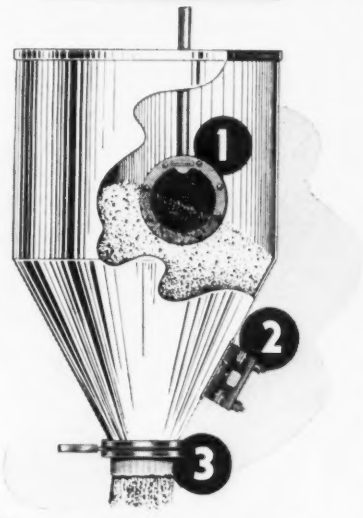
WIRE ROPE ASSEMBLIES: Macwhyte Co., Kenosha, Wis.—Catalog 5201, dealing with wire rope assemblies, illustrates and gives detailed specifications for wire rope with fittings permanently attached.

For More Details Circle No. 124—Page 237

POWER WHEELBARROW: Kwik-Mix Co., Port Washington, Wis. — Bulletin shows company power wheelbarrow, with its various attachments, in use in numerous applications.

For More Details Circle No. 125—Page 237

for Complete Hopper Efficiency



SYNTRON

1. Hopper Level Switches Eliminate spillage and shortage of materials. Automatically maintain desired levels of materials — from fine to coarse—in bins and hoppers. Control feeding.

2. Electric Vibrators Assure free-flowing bins, hoppers and chutes. Eliminate arching and plugging of materials without hammering and rodding that damages equipment and wastes manpower.

3. Flow Control Valves Control flow of bulk materials from bins, hoppers and chutes. Rotating control lever increases or decreases opening of flexible iris type diaphragm and flow of material without jamming and clogging.

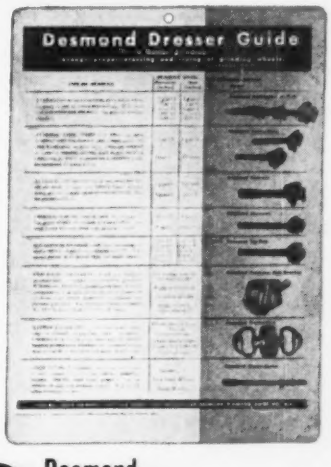
Write For FREE Illustrated Folders

SYNTRON COMPANY
540 Lexington Avenue Homer City, Penna.

USE THESE AIDS *for better grinding*

1 Genuine Desmond Cutters

For best wheel dressing results and longest cutter life, ask for Desmond cutters and replacement parts by name: High carbon steel cutters are accurately milled and carefully heat treated for maximum hardness. Quickly identified by the easy-to-read Desmond labels.



2 Desmond Dresser Guide

For maximum grinding production keep all your grinding wheels properly dressed with the right Desmond dresser. Handy 9" x 12" Dresser Guide for tool cribs and grinding departments helps you select the right tool for every job. Free on request. Ask your Industrial Distributor.

3 Qualified Desmond Distributors

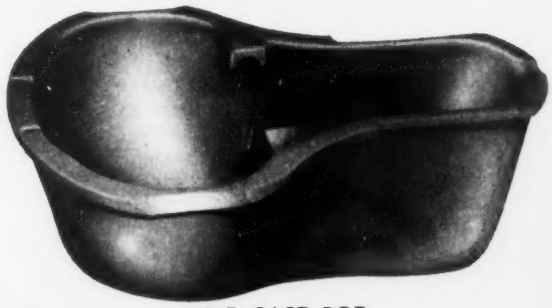
Your nearby Desmond distributor knows your local needs and has the technical data and know-how to insure best results. Have your distributor fill out the Desmond Dresser Survey Form for factory recommendations of dresser and cutter for your grinding application. The Desmond-Stephan Mfg. Co., Urbana, Ohio.

Desmond
DRESSERS & CUTTERS

MELTING POTS—Ingot Molds

FOR NONFERROUS METALS FROM ACME SPECIAL FORMULA

SPOUT POT
NO. 550A



DIE CAST POT

HOLDING BOWL
NO. HP7001

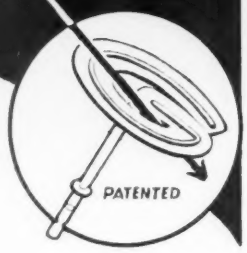
WRITE FOR
SCHEDULE OF 40 SIZES

ACME FOUNDRY COMPANY

2502 22nd Street **DETROIT 16, MICH.** *Phone:* Tashmoo 5-2404

CLEVELAND Coil Head
Shoulder Radiator Chaplet

OPEN HEAD



REDUCES CASTING REJECTS

Core support failures are minimized because you can pack sand better under head and around stem of this chaplet.

CLEVELAND CHAPLET & MFG. CO.
26470 Lakeland Blvd.
Cleveland 22, Ohio

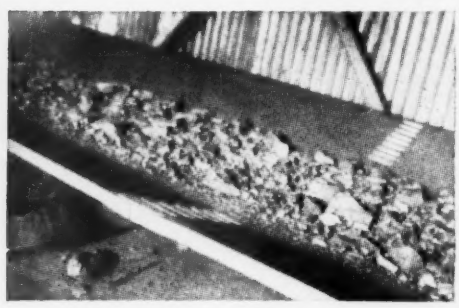
WRITE FOR BULLETIN showing various types of Cleveland Chaplets.

CLEVELAND *Chaplets*

Since 1890

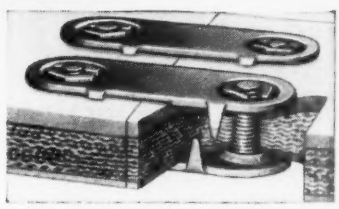
FLEXCO®

BELT FASTENERS and RIP PLATES



FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

★ FLEXCO Fasteners make tight butt joints of great strength and durability.
★ Trough naturally, operate smoothly through take-up pulleys.
★ Distribute pull or tension uniformly.
★ Made of Steel, Monel, Stainless, Everdur. Also Promal top plates.

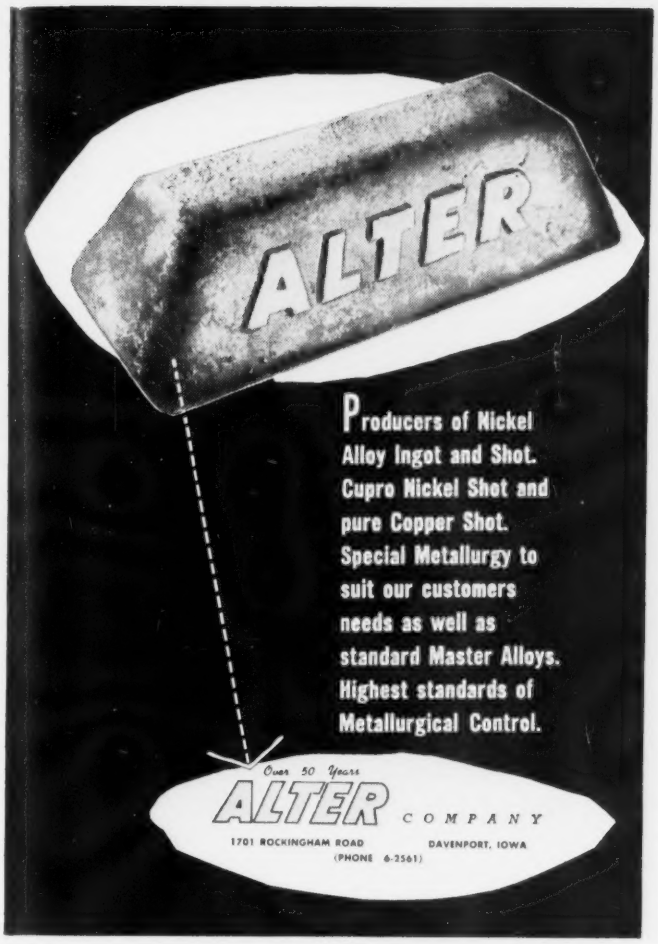


Compression Grip distributes strain over whole plate area

★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.

Order From Your Supply House. Ask for Bulletin F-100

FLEXIBLE STEEL LACING CO.
4667 Lexington St., Chicago 44, Ill.


ALTER
Producers of Nickel Alloy Ingot and Shot. Cupro Nickel Shot and pure Copper Shot. Special Metallurgy to suit our customers needs as well as standard Master Alloys. Highest standards of Metallurgical Control.
Over 50 Years
ALTER COMPANY
1701 ROCKINGHAM ROAD DAVENPORT, IOWA
(PHONE 6-2561)

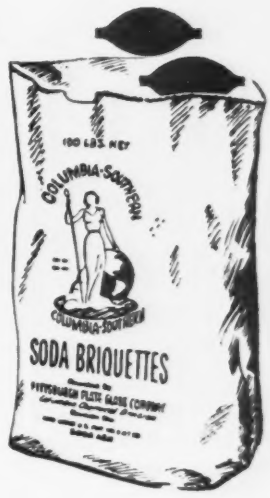
COLUMBIA-SOUTHERN SODA BRIQUETTES FOR REDUCTION OF SULPHUR AND PHYSICAL CLEANSING OF IRON

You will find Columbia-Southern Soda Briquettes efficient and inexpensive to use in your blast furnace or foundry operations.

Columbia-Southern Soda Briquettes are designed specifically for iron desulphurizing and physical cleansing of iron. That is why they work so fast and effectively.

Walnut in shape and size, they expose maximum surface area for quick, dependable performance. There is no dust, no waste, to Columbia-Southern Soda Briquettes.

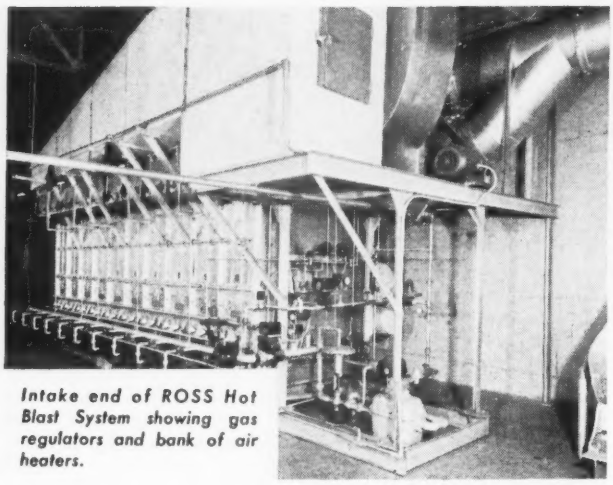
They are packed in handy 100 lb. paper bags for ease in moving and storage. Order your supply now and see if you don't agree that they do the job faster, better and more efficiently.



COLUMBIA-SOUTHERN
CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
FIFTH AT BELLEFIELD, PITTSBURGH 13, PA.

DISTRICT OFFICES: BOSTON • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • HOUSTON • MINNEAPOLIS • NEW ORLEANS • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS

Cutting Costs For Coke and Labor *with*



Intake end of ROSS Hot Blast System showing gas regulators and bank of air heaters.

ROSS *hot blast* CUPOLA HEATING

The secret of the savings being secured in the Richmond, California plant of American Radiator & Standard Sanitary Corp. lies in the hotter iron obtained from operating their ROSS Hot Blast System. This modern method of preheating the air to the cupolas produces substantial saving in coke and silicon, reduces loss due to rejects and cuts maintenance expense to the minimum. At present costs for fuel, labor and material, no modern foundry can ignore such savings. Write for particulars.

Better utilization of air to solve processing problems has been the ROSS specialty for more than 30 years. ROSS Air Heaters, Drying, Baking, Curing and Heat Treating Ovens are recognized "tops" from a standpoint of design, construction and performance.

J. O. ROSS ENGINEERING CORPORATION

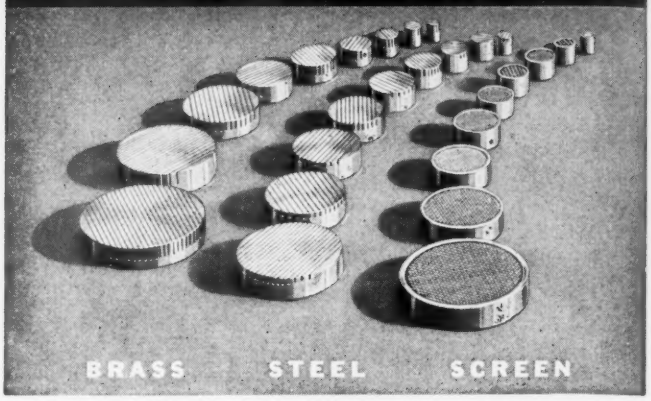
Designers and Builders of Air Processing Systems

ROSS SYSTEMS

NEW YORK 22—444 Madison Avenue
CHICAGO 6—201 N. Wells Street
BOSTON 9—79 Milk Street
DETROIT 4—9225 Grand River Avenue
LOS ANGELES 17—600 St. Paul Avenue
SEATTLE 1—823 Skinner Bldg.

ROSS ENGINEERING OF CANADA, LTD.—MONTREAL, VANCOUVER
CARRIER ROSS ENGINEERING COMPANY, LTD., LONDON, ENGLAND

PRECISION CORE BOX VENTS



You can depend on the quality that is built into every Demmler Core Box Vent. All orders are promptly filled from stock.

SLOTTED VENTS
(Available in Brass or Steel)
Slot Widths: .010", .013", .015"
Diameters: 1/8", 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8" 1", 1 1/4", 1 1/2"

STAINLESS STEEL SCREEN VENTS
Mesh: #30, #40, #50
Diameters: 3/16", 1/4", 5/16", 3/8", 7/16", 1/2", 5/8", 3/4", 7/8", 1", 1 1/4", 1 1/2"

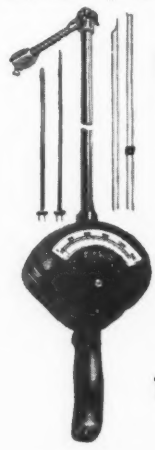
ILLUSTRATED FOLDER ON REQUEST

Wm. DEMMLER & Bros.
Kewanee, Illinois

Measure Foundry Temperatures Accurately . . . at a glance!

Use the Simplified PYRO Optical Pyrometer

Any operator can quickly determine temperatures of minute spots, fast-moving objects and smallest streams with the simplified PYRO Optical Pyrometer. Completely self-contained—no calibration charts or accessories needed. An accurate, DIRECT-READING instrument that will pay for itself many times over by helping prevent spoilage. Weighs just 3 lbs. Available in 5 ranges (1400° to 7500° F.) *Write for FREE CATALOG #80, today!*



For Non-Ferrous Foundries . . . the PYRO IMMERSION PYROMETER

Helps insure low-cost production of SOUND, UNIFORM Castings. Has shielded steel housing which is shock-proof, dust-proof and moisture-proof—withstands roughest handling. "Protected Type" and "Bare Metal" thermocouples are instantly interchangeable, without adjustment or recalibration. Large 4-inch easy-reading dial. Equipped with exclusive LOCK SWIVEL. Available in 6 ranges (1000°F to 2500°F). *Write for FREE Catalog #150*

THE PYROMETER INSTRUMENT CO.
New Plant & Lab.
Bergenfield 6, New Jersey

STURDY, RUGGED ALL STEEL CONSTRUCTION

MASSIVE LINKS OCCUPYING ENTIRE SPACE BETWEEN TIEBARS ASSURE MAXIMUM LOCKING PRESSURE FOR OFF-CENTER DIES • SIX SHEAR POINTS MINIMIZE LINK PIN BREAKAGE

Hydraulic Core-Pull and Ejection Manifold mounted on movable plate. This permits core-pull cylinders to be piped in solid, eliminating all flexible hose.

COMPLETE SPECIFICATIONS ON REQUEST!

CAST-MASTER

Die Casting Machines

CAST-MASTER, INC. • 2123 HAMILTON AVE., CLEVELAND 14, OHIO

Having Trouble With Casting Rejects?

TRY

WATERLOX

TRANSPARENT

CASTING SEALER

Eliminate leaky castings by impregnation. Save time, money, labor and materials.

WRITE TODAY FOR DETAILS

WATERLOX DIVISION

of

THE EMPIRE VARNISH COMPANY

2636 E. 76th St. CLEVELAND 4, OHIO

No. 4 DAYTON RING VALVE BENCH RAMMER

MORE POWER—MORE SPEED

You'll get more production with these faster, more powerful rammers and at the same time substantially reduce maintenance costs.

The Valve Units will last for years. The Cylinder Bores and Piston Rods are HARD CHROME PLATED which doubles the life of the Rammer. Many of the largest foundries in the country have already adopted them as standard. Made in six sizes to meet every requirement.

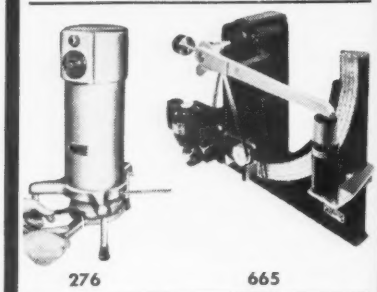
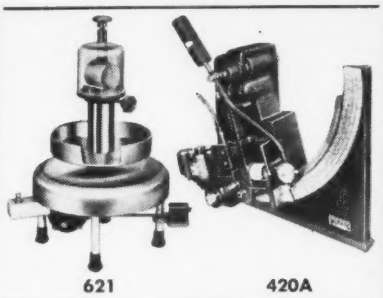
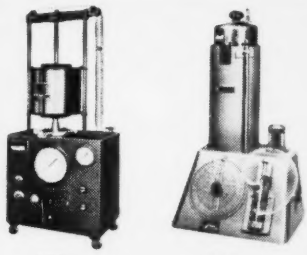
Send for Bulletin 300

DAYTON PNEUMATIC TOOL CO.

Manufacturers of Pneumatic Tools Since 1903

DAYTON, OHIO

It Pays to Control SAND • CORES • MOLDS

FOR	EASIER MOLDING	EASIER CORE MAKING	BETTER CASTING QUALITY
USE THIS EQUIPMENT	 276 665	 621 420A	 785 335
MAKE THESE TESTS	GREEN STRENGTH GREEN DEFORMATION FLOWABILITY MOISTURE GREEN HARDNESS	GREEN STRENGTH SAG RESISTANCE CRACK RESISTANCE BLOWABILITY STICKINESS	HOT STRENGTH HOT DEFORMATION PERMEABILITY COMBUSTIBLES FINENESS

Write TODAY TO DEPT. B FOR DETAILS

HARRY W. Dietert COMPANY

CONTROL EQUIPMENT SAND · MOLD · MOISTURE CARBON · SULFUR

9330 ROSELAWN AVE. • DETROIT 4, MICHIGAN

SAND SCHOOL AUGUST 11 - 13 IN DETROIT

A BLAST FURNACE PRODUCT

Smelted from Superior quality lake ores, high grade metallurgical coke and limestone, using our own local No. 1 Sharon Seam coal.

A "blend" with JISCO is sound metallurgy.

HIGH SILICON IRON JISCO

THE JACKSON IRON & STEEL Company

JACKSON, OHIO

TUMBLING BARRELS

Roller Bearing throughout
Direct Motor Drive with Speed Reducer
V Belt Motor Drive—Tight & Loose Pulley Drive

ROYERSFORD FOUNDRY & MACHINE CO.
BOX F
ROYERSFORD, PA.

A. A. WICKLAND & CO.

FOUNDRY CONSULTANTS

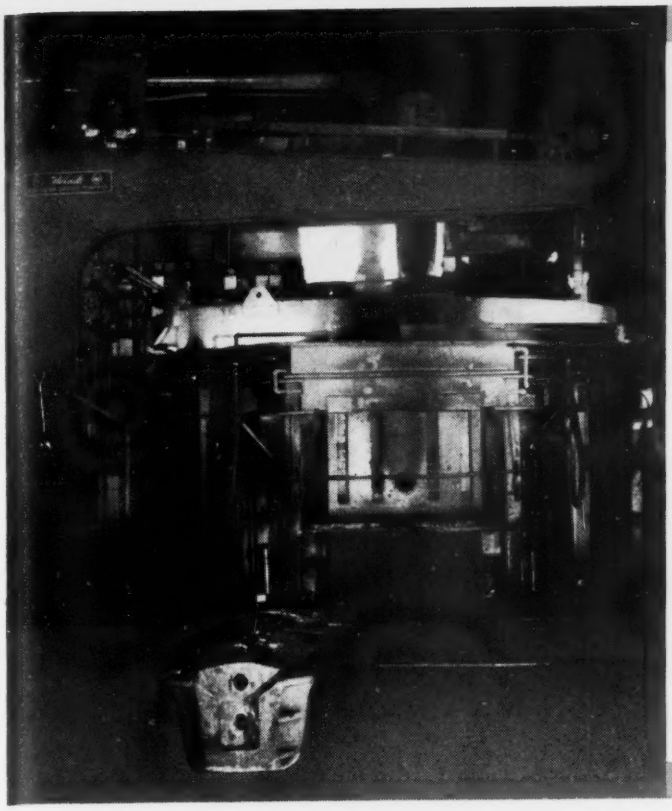
ENGINEERING BUILDING · CHICAGO 6, ILLINOIS

EMPIRE

"THAT GOOD"

FOUNDRY COKE

DEBARDELEBEN COAL CORPORATION
2201 First Ave., North • Birmingham 3, Ala.
Phone 3-9135



Heroult

ELECTRIC MELTING FURNACE

. . . as ever, the dependable furnace for the production of high-grade stainless, alloy and rimming steels.

Removable roof of new design now available for the larger furnaces.

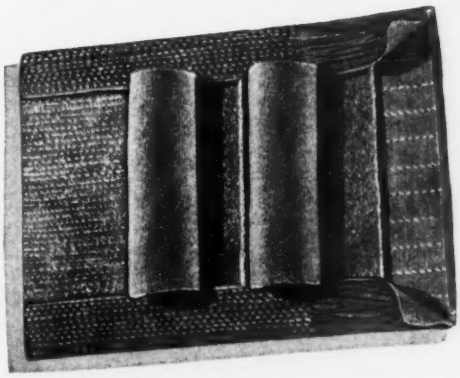
AMERICAN BRIDGE DIVISION
UNITED STATES STEEL COMPANY

General Offices: 525 William Penn Place, Pittsburgh, Pa.
Contracting Offices in New York, Philadelphia, Chicago, San Francisco and other principal cities

AMERICAN BRIDGE

USS

UNITED STATES STEEL



FLEXIBLE* DANDUX BELTING FOREMOST IN THE FOUNDRY

* **Special Dandux Compounds** give internal lubrication, flexibility and long life.
* Constructed with special heat-resistant carcass and surface.

Through 300°F—**DANDUX PYROFLEX** No. 60-20
Through 450°F—**DANDUX INSULEX** No. 60-25
Above 450°F—**DANDUX DOUBLE INSULEX** No. 60-26

STITCHED CANVAS BELTING

Dandux invites your inquiry.

Contact our nearest office where counsel is available from personnel of more than 70 years experience.

INNER-SEWED — DANDUX BELTING — LOCK-STITCHED

QUALITY • INTEGRITY • CRAFTSMANSHIP

C. R. DANIELS, INC., Belting Div.

CHICAGO 6, ILL. 549 W. Randolph St.
BALTIMORE 16, MD. 4900 Wetheredsville Rd.
Offices in Principal Cities

HAUCK OIL AND GAS BURNING EQUIPMENT

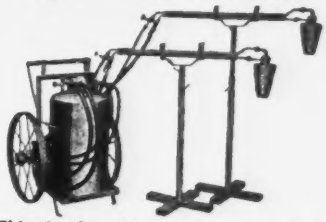
for
- CUPOLA LIGHTING
- MOLD DRYING
- LADLE HEATING
- CORE BAKING
- FURNACE HEATING

Compressed air portable oil burner equipment for lighting cupolas and drying molds. Also hand pump types.

Venturi compressed air "suction" hand torches — no preheating, for drying linings, cores, molds.

Portable venturi high pressure oil burners with adjustable burner stand for heating and drying ladles.

Featuring
Portable Ladle Heating High Pressure Oil Burners



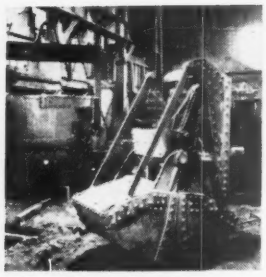
This simple, safe, rugged, economical equipment with single or double venturi high pressure air type oil burners, adjustable stands, steel truck and fuel tank is available for heating ladles from 500 to 10,000 lbs. capacity. Enthusiastic users state it cuts drying time up to 80%. Write for Hauck Foundry Equipment Catalog—free.

HAUCK MANUFACTURING CO.
106 Tenth St., Brooklyn 15, N. Y.

Venturi low pressure and high pressure air atomizing oil burners for ladle heating, core and mold ovens, melting and annealing furnaces.

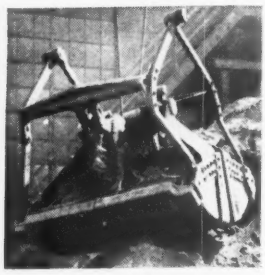
These Four BLAW-KNOX *Buckets*
Help Solve Your Rehandling Problems for Average or Unusual Conditions

FOR AVERAGE HEADROOM



THERE is a type and size of Blaw-Knox Single-Line Hook-On Foundry Buckets to meet a wide range of operating conditions. Blaw-Knox can best give you the competent engineering service that makes possible selection of the bucket suited to your needs.

FOR EXTREMELY LOW HEADROOM

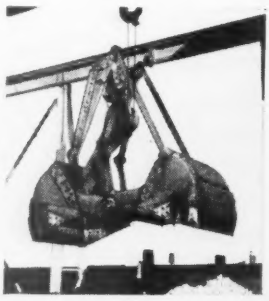


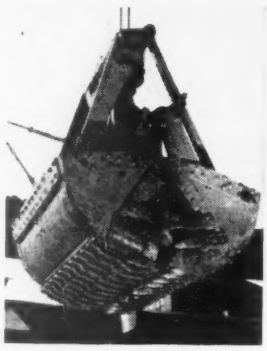
THIS Single-Line Hook-On Bucket solves rehandling problems when headroom is extremely limited. The ¾ yd. capacity bucket requires only 6'7" operating headroom. Also available in larger sizes.

FOR COKE AND SAND
"Shark Tooth" Single-Line Hook-On Buckets

HERE'S the answer to the problem of handling coke and sand . . . simply by adding or removing liner plates, the *same* dual purpose Blaw-Knox Bucket handles both, with minimum degradation of coke and without sand leakage! The illustration at the upper right shows an open head type Single-Line Hook-On Bucket, rated 1 cubic yard, with liner plates applied inside of the shark teeth for handling sand, coal, small limestone and granular fines. Illustrated at the right is a closed head type 1 cubic yard Shark Tooth Bucket without liner plates for coke handling.

Blaw-Knox Shark Tooth Buckets are available in a wide range of sizes and for different headroom conditions.





Write for Bulletin 2232 today

BLAW-KNOX DIVISION
of Blaw-Knox Company
2097 Farmers Bank Bldg., Pittsburgh 22, Pa.
New York • Chicago • Philadelphia • Birmingham
Washington • San Francisco

BLAW-KNOX
FOUNDRY BUCKETS

COLOR YOUR CORE SANDS

Modern foundries have found it practical to color their various grades of core sands. This eliminates guesswork and assures the proper use of the required type of core sand for the particular job at hand.

Our laboratories have developed a line of special dyes in a range of colors that have been carefully tested and found suitable as well as economical.

Write us for details and samples.

EATON CHEMICAL AND DYESTUFF COMPANY

1490 Franklin Street — Established in the year 1838 — Detroit 7, Michigan

Canadian Branches: Windsor and Toronto

FLASK LUMBER
PATTERN LUMBER
PATTERN MAHOGANY

Well Manufactured—Kiln Dried in our own Kilns for Your Protection

ALSO: complete line of HARDWOOD, CRATING, PLYWOOD, TIMBER, MASONITE

Call Diamond 1-1200

DOUGHERTY LUMBER CO.
4300 E. 68th St. CLEVELAND 5, OHIO

FOUNDRY

EDWIN S. CARMAN, INC.

LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO

A COMPLETE FOUNDRY SERVICE

MODERNIZATION

For Batch Mixing there are SIX KENT UNITS

They feature safe loading; correctly designed blades for rapid, thorough mixing; fast, clean discharging; anti-friction bearings with pressure grease fittings; renewable liner bars, etc.

Six sizes available—12, 18, 24, 30, 42 and 50 cubic feet—all conservatively rated. Furnished with V-belt drive, flat pulley or direct drive through pinion to bull gear.

Write us regarding your mixing problems and let a KENT engineer consult with you. No obligation will be entailed.

The **KENT MACHINE COMPANY**

Manufacturers of Mixers Since 1915

CUYAHOGA FALLS, OHIO

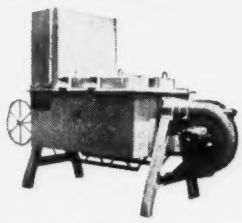
For thorough mixing in large volume more and more plants are installing

KENT
Continuous
MIXERS

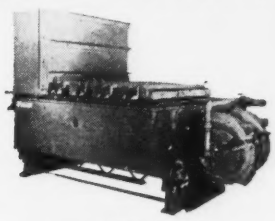
Materials are fed *automatically*, proportioned *automatically*, mixed *automatically*, discharged *automatically* and *continuously*.

Savings are made in first cost, in labor cost, in power cost, in upkeep costs.

SUPERIOR PERFORMANCE



400 Series



1000 Series

Reda Stack-Loading melting furnaces for ferrous and non-ferrous metals have been designed and built by experienced foundrymen for foundrymen everywhere. That is why Reda furnaces provide advantages far beyond those found in other, and more expensive types; that is why, with Reda furnaces there is less down time for maintenance, longer, uninterrupted melting runs, and lower melting costs.

Another feature is the Reda Burner arrangement which can operate from oil and gas simultaneously or be switched from one fuel to the other instantly.

Write or phone for complete details.

	CHARGE		MELT CAP./HR.	
SERIES	IRON	BRONZE	IRON	BRONZE
400	400#	450#	800#	1350#
550	550#	625#	1100#	1875#
1000	1000#	1125#	2000#	3375#
2000	2000#	2250#	4000#	6750#

LARGER MODELS ON REQUEST

STACK LOADING
DIRECT FIRED—REFLECTING TYPE

REDA FURNACE

REDA PUMP CO. Bartlesville, Okla.

Master Power

HARD CHROMED • PORTABLE PNEUMATIC TOOLS

DO MORE WORK AT LESS COST

because they deliver more power per cubic foot of air consumed, are light in weight for easier maneuverability and they retain their new tool power longer.

ARE PREFERRED BY OPERATORS

because they are lighter in weight, better balanced and designed to reduce shock and be free from vibration.

IF YOUR PROBLEM INCLUDES

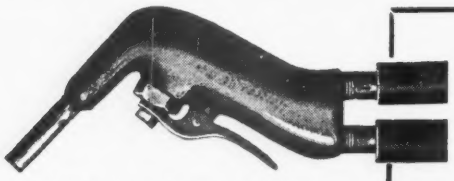
chipping, ramming, grinding, buffing, sanding or wire brushing, *write us today for full particulars.*

THE MASTER PNEUMATIC TOOL COMPANY, INC.

ORWELL, OHIO • U. S. A.

SALES • SERVICE • STOCK • COAST TO COAST

Eliminate—SWABS . . BRUSHES SPRAY CANS with the MURPHY PISTOL SPRAYER



OVER A MILLION SOLD TO DATE

The MURPHY PISTOL SPRAYER shoots blackening into hidden pockets beyond the reach of swabs. Jobs are completed faster and castings peel better and come cleaner. It is of great value in cleaning permanent molds, for aluminum and other metals as well as for sand blasting. For silica wash, oil, water or any liquid material and as a blow gun for cleaning parts and machinery. We guarantee this sprayer, designed by a practical foundryman . . . Write today!

PRICES COMPLETE WITH SUCTION HOSE AND SINKER

PIPE SIZE	1/16"	1/8"	1/4"	3/8"	1/2"
PRICE F. O. B. HAMILTON, O.	$12.00	$12.00	$12.00	$14.50	$18.00

HAMILTON SPRAY GUN

Complete with 4½ ft. suction hose and sinker . . . **$10.00 F.O.B.** Hamilton, O. *For spraying molds and cores with any liquid. For cleaning motors and machinery. For laying dust. Trigger control. Well made and guaranteed.*

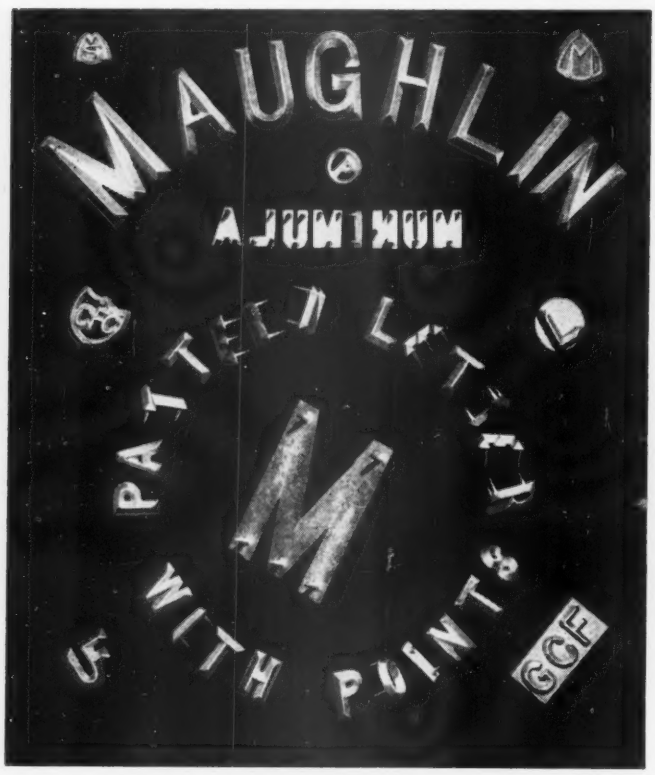
GUARANTEED COMPRESSED AIR PRODUCTS

AFTERCOOLERS • SEPARATORS • STRAINERS • TRAPS
SPRAY GUNS • PISTOL SPRAYERS

JAS. A. MURPHY & CO., INC.
HAMILTON, OHIO

Moisture Elimination Up To 3000 Pounds Per Square Inch

A Hammer Blow Secures Letters To Pattern



THE H. P. MAUGHLIN CO.
953 Ingleside Ave., Columbus, Ohio
Manufacturers of letters and numbers exclusively for over 30 years

EF

GAS, OIL AND ELECTRIC FURNACES
For all annealing and heat treating requirements
THE ELECTRIC FURNACE CO. • SALEM, OHIO

CROBAUGH LABORATORIES
Chemists — Metallurgists
FOUNDRY SERVICE
THE FRANK L. CROBAUGH CO.
Phone SUperior 1-4712 CLEVELAND 13, O.

WELLMAN
Williams Type

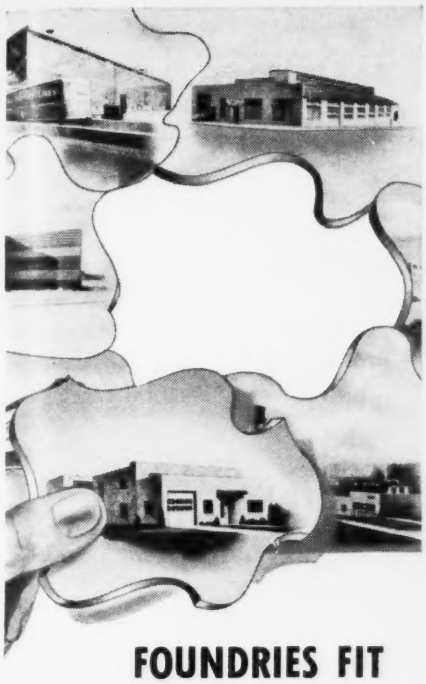
INSTANT "ON-AND-OFF" SERVICE ANYWHERE

The Wellman "Hook-on", single-line bucket is designed to provide clamshell bucket service at any crane hook where suitable head room and hoist capacity are available.

Hook the yoke over the crane hook and the bucket is ready for work. When the job is finished, take the yoke off the hook and the crane is free for other duties.

Capacities from ⅜ to 2 cubic yards. Write for free bulletin.

THE WELLMAN ENGINEERING CO. 7019 CENTRAL AVE. CLEVELAND 4, OHIO



FOUNDRIES FIT INTO NO OTHER MARKET

THINGS ARE HAPPENING IN THE FOUNDRY INDUSTRY

Foundrymen speak a "language of their own" and those who sell successfully to foundries learned a long time ago to recognize them as an individual market—bound together by common practices and common problems found in no other industry.

An independent sales effort directed to foundries will pay dividends . . . this mass production industry is spending *over one million dollars every hour for materials and supplies—and two million dollars every week in capital investments.*

To meet the demand for castings, America's foundries last year topped every previous production record, including peak war years!

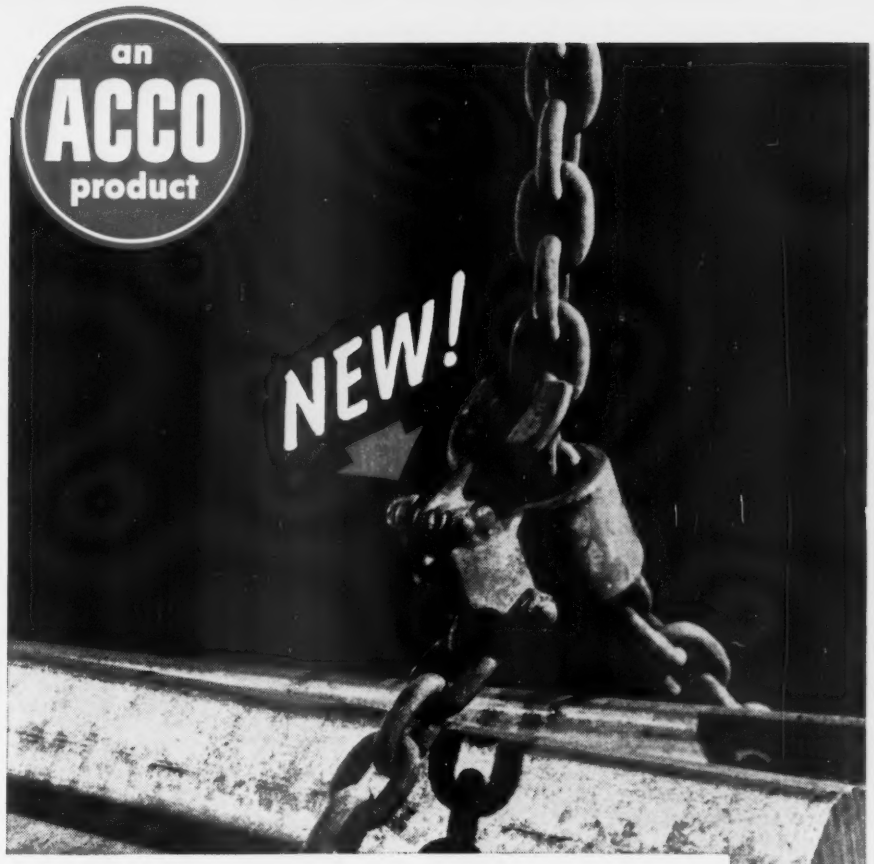
To make sure your story gets across to foundrymen, tell it in FOUNDRY. With its 45,000 readers, FOUNDRY gives you blanket coverage of the foundries that have 94% of the industry's melting capacity.

DO YOU HAVE THESE MARKETING AIDS?

- Marketing Guide, "How To Sell the Foundry Market." Available free.
- Data File, "Sizing up the Foundry Market." Available free.
- Penton's Foundry Directory. Cost $75.00.

NBP CCA **FOUNDRY**

A Penton Publication
Penton Building
Cleveland 13, Ohio



Lock 'em—and Leave 'em

• If you have a problem lifting, moving or containing bundles of bars, rods, or pipes—forget it. Get some of the new AMERICAN Bundling Chains with automatic locks. They're easy to hook up, and once you lock them, they stay locked. Yet you can unlock them with a flip of the fork. Satisfied users tell us they have made possible real savings in handling costs.

Write today for information on Bundle Locks or the 1001 other items in the complete AMERICAN Chain line.

(Patent Pending)

ACCO

TRADE MARK

AMERICAN CHAIN DIVISION
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

American Chain

Use Self-Dumping Containers

USE THE ORIGINAL ROURA Self-Dumping HOPPERS

Save

TIME and LABOR

Imitated by Many—
Not Equaled by Any

—they pay for themselves

Only ROURA Has The Exclusive PATENTED Instant Release Handle

Handling wet or dry, hot or cold, bulky materials quickly and easily, the ROURA is simple to operate—only one man is required for distributing and unloading—and he does this in much less time than ordinarily required under old-fashioned manual methods. Thousands of Roura Hoppers (which fit any standard fork or platform lift truck) are in constant daily operation, serving and saving for such firms as Owens-Illinois Glass, Corning Glass, National Fireproofing, General Motors, Ford, Chrysler, American Brake Shoe, General Electric, Westinghouse, Western Electric, American Steel Foundries, International Harvester, John Deere, etc.

By a simple lift of the exclusive release handle, the ROURA HOPPER dumps, rights and locks itself securely. Sizes—½, ¾, 1, 1½ and 2 cubic yards; the ROURA HOPPER can also be designed for flat trucks and in other sizes to meet specifications. Also, it can be equipped with special flanges that permit stacking to desired tiers for storage or future distribution of materials—conserving valuable floor space. Priced below all competition, the ROURA will quickly pay for itself many times over.

—Can Be Coated With Acid-Resistant Paints

Write today for detailed brochure, "In Dollars & Sense."

ROURA IRON WORKS, Inc.
1417 Woodland Ave. Detroit 11, Mich.

Reduce Use of Chills in Gray Iron Casting

Now all you have to do to get hard chilled iron is add

TELLURIUM

Comes in 1, 2, 3, and 4-gram tablets; also in powder, slabs and sticks. For full information, write Dept. LM for 16-page article on the use of TELLURIUM in chill control.

American Smelting and Refining Company
120 BROADWAY • NEW YORK 5, N.Y.

CLARK'S CAST STEEL CEMENT

THE ORIGINAL METALLIC FILLER FOR FERROUS CASTINGS

Just mix with water and apply cold. Sets quickly, and to all intents and purposes becomes part of the casting. Eliminates sand holes, blow holes and minor defects—just finish off with file or emery paper. Used by large and small foundries and machine shops ...many imitators but only one Clark's Cast Steel Cement.

WRITE FOR LATEST FOLDER. Complete information as to use and uses; prices and free sample offer for testing.

THE CLARK CAST STEEL CEMENT CO.
P.O. Box 21, WILMINGTON 99, DELAWARE

OUR TIME WILL SAVE YOUR MONEY!

We can guarantee savings from

25% to 75% in your WOOD PATTERN COSTS

An inquiry will bring full particulars

FAR EAST PATTERNMAKERS GUILD
Shinjuku P.O. Box No. 36 Tokyo, Japan

SHAKE OUT DECKS

Rebuilt with:

MANGANAL

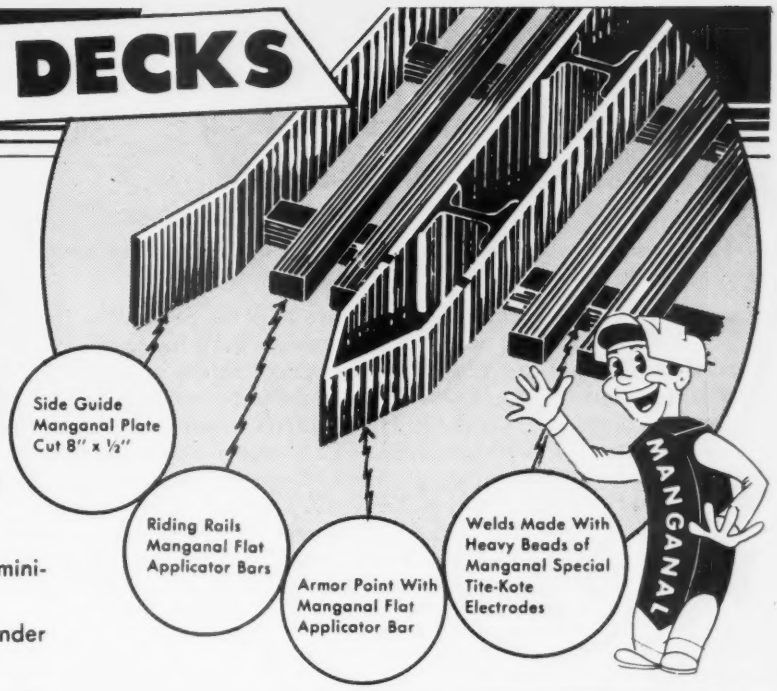
U.S. Patents 1,876,738-1,947,167-2,021,945

11% — 13½% Manganese-Nickel Steel

. . . Cuts Maintenance Costs

. . . Far Outlasts New Decks

- MANGANAL is the toughest metal known — minimizes wear from impact and abrasion.
- MANGANAL workhardens up to 550 Brinell under impact and abrasion, giving it longer life.
- MANGANAL has a tensile strength of up to 150,000 p.s.i. Eliminates breakage.
- MANGANAL saves time — saves money — speeds repairs.


Side Guide Manganal Plate Cut 8" x ½"
Riding Rails Manganal Flat Applicator Bars
Armor Point With Manganal Flat Applicator Bar
Welds Made With Heavy Beads of Manganal Special Tite-Kote Electrodes
MANGANAL

FREE

Literature on latest methods for speedy and economical repair of worn equipment.

WRITE FOR IT!

•

Nearest Distributor Upon Request

STULZ-SICKLES CO.

SOLE PRODUCERS — 92 N. J. RAILROAD AVE., NEWARK 5, N. J.

Impregnate
PRESSURE CASTINGS
Economically

A positive, low-cost method of impregnating pressure castings to meet the most rigid specifications. Pressure castings impregnated with this equipment have been successfully subjected to severe tests with hot kerosene, hot oil, hot water and other solutions under pressure, with no evidence of porosity remaining.

Meets All Contract Specifications

If your contract calls for casting impregnation, get the facts on this MOGULLIZER packaged plant which utilizes both pressure and vacuum stages.

Write today for free literature and recommendations for your casting salvage problems.

NOTE: There are job shops in certain areas who can take care of your contract work. A few territories are still open for job shop installation. Write for set-up plan today.

METALLIZING CO. OF AMERICA

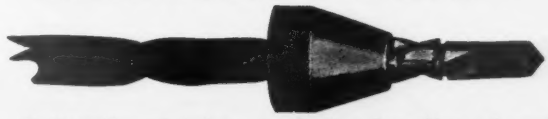
Dept. F, 3520 W. Carroll Ave., Chicago 24, Ill., Telephone: SAcramento 2-3710

SERVING YOU

in

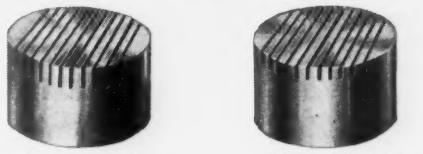
"Core Blowing Operations"

INSERTING DRILL



- Uniformity of holes
- Faster insertion of vent
- Correct Depth

CORE BOX VENTS



DEEP HEAD — Wide or Narrow Slots .014 .018

SHALLOW HEAD — Wide or Narrow Slots .014 .018

VENT CLEANER

For Cleaning Slots

Made of Tempered Steel, Easy to Use

C. M. SMILLIE & CO.

1124 WOODWARD HGTS., FERNDALE 20, MICHIGAN

TOOLS • PRECISION MACHINED and GROUND PARTS • FIXTURES

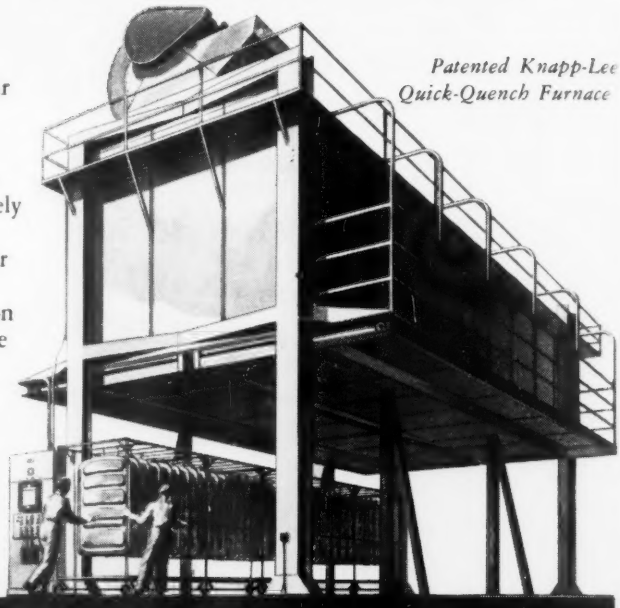
TOUGH PRODUCTION PROBLEMS

MADE EASIER WITH KNAPP'S 30 YEARS KNOW-HOW!

Manufacturers who have tough production schedules equip their plants with Knapp heat-treating equipment.

They are using them because they are built for SPEED:—Temperature recovery well within established limits. Quench adjustable from 3 to 8 seconds with arrested descent immediately before immersion, thus reducing impact and preventing excessive distortion; EASE OF HANDLING:—assured by floor level loading and unloading; SAFETY:—positive locking devices at floor level and top positions, all operations push button controlled by one operator; ACCURACY:—guaranteed variance of temperature not to exceed plus or minus 5°F in any part of the working zone after stabilization; QUALITY:—uniformly high physical and chemical properties due to the elimination of the human element.

Over 40 Airframe and other Manufacturers in the U.S. and abroad are meeting their production schedules with patented Knapp-Lee Quick-Quench furnaces.



Patented Knapp-Lee Quick-Quench Furnace

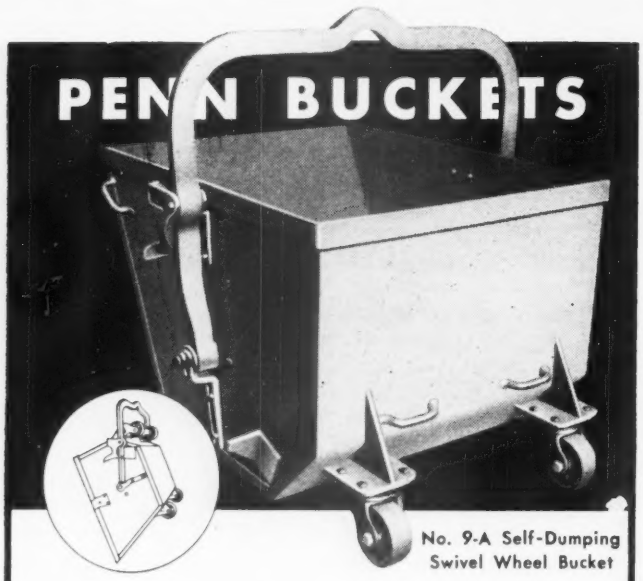
The Knapp reputation for building better equipment is maintained throughout its entire line of standard and custom built furnaces. Knapp has the answer to your heat treating problems. Write today.

JAMES H. KNAPP COMPANY
INCORPORATED

INDUSTRIAL FURNACES THAT SATISFY

839-841 EAST FOURTH STREET • LOS ANGELES 13, CALIFORNIA

PENN BUCKETS



No. 9-A Self-Dumping Swivel Wheel Bucket

Careful balancing makes Penn Buckets self-dumping when loaded and self-righting when empty. Welded construction prevents "clinging", makes them empty easily and completely. The swivel wheels increase handling efficiency, too.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION MEMBER FEMA

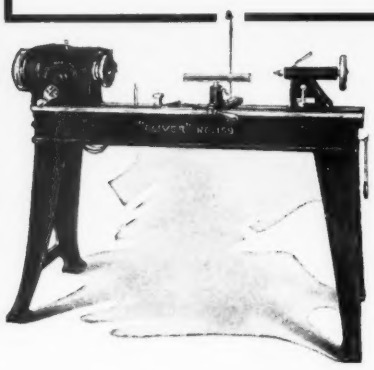
WRITE TODAY FOR NEW BULLETIN DIMENSION SHEET AND PRICE LIST

PENN IRON WORKS, INC.
READING, PENNA.

"OLIVER"

No. 159-A Motor Driven

SPEED LATHE



. . . for pattern shops . . . an easy running precision built Lathe for smoothest wood turning

On work in its capacity this Lathe saves valuable time. It swings 12″ diameter, 24″ between centers —bed 48″ long. Unit type motor and V-belt driven headstock gives spindle speed of 800 to 2750 r.p.m. Spindle lock simplifies removal of face plates. Write for Bulletin 159-A.

"Oliver" makes a complete line of Woodturning Lathes for pattern shops

OLIVER MACHINERY COMPANY
Established 1890 GRAND RAPIDS 2, MICHIGAN

AMASTEEL.....!

For low cost cleaning

- AMASTEEL is the blast cleaning material that is engineered for the job.
- AMASTEEL assures the lowest cleaning cost.
- AMASTEEL lasts many times longer. Investigate!
- AMASTEEL provides peak efficiency in shot for blast cleaning and peening. Developed by the maker of "PEENBLAST", "CLEANBLAST" and "ALLOY 99".

Abrasive for any and all kinds of work.

PRODUCERS OF
PEENBLAST
CLEANBLAST
ALLOY 99

ALLOY METAL ABRASIVE CO.
311 WEST HURON ST. ANN ARBOR, MICH.

TERRE HAUTE
SPECIAL
FOUNDRY COKE

★

A QUALITY PRODUCT

Sold Exclusively by
REPUBLIC COAL & COKE CO.
8 South Michigan Ave., Chicago 3, Illinois
BRANCHES: Peoria • New York • Indianapolis • Milwaukee • Minneapolis • St. Louis
Detroit • Cleveland • Cincinnati
Manufactured at Terre Haute, Indiana by INDIANA GAS & CHEMICAL CORPORATION

LIGHT — MEDIUM — DARK
. . . a shade to match every iron or steel casting

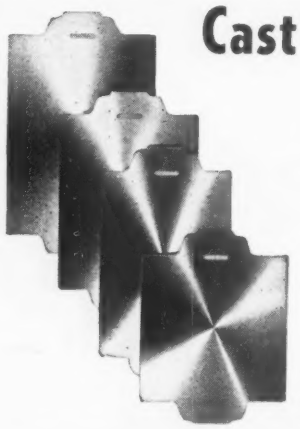
Because different cast metals vary in shade and texture, Smooth-On No. 4 Foundry Cement is supplied in three shades, to match light, medium and dark gray metals. This enables you to make repairs that are almost invisible when you true up small holes, pock-marks, depressions. For light gray, finer textured metal you use Smooth-On No. 4AA, which may be filed and machined. Medium gray castings call for No. 4A. Dark gray castings of coarser texture are matched with Smooth-On No. 4B. If your supply house hasn't Smooth-On Foundry Cements, write us.

FREE Samples and Handbook

Try Smooth-On No. 4 at our expense. Write for free sample in the shade you'd like to try. We'll send also the 40-page Smooth-On Handbook describing other Smooth-On Cements and their time-and-money-saving uses. Write TODAY.

SMOOTH-ON MFG. CO., Dept. 17
570 Communipaw Ave., Jersey City 4, N. J.

Do it with **SMOOTH-ON**
FOUNDRY CEMENT



Cast Aluminum MACHINED PATTERN PLATES

Shipped promptly from the World's Largest Stock

All standard flask sizes are carried in stock. All plates are cast with one inch flask margin all around PLUS large, well shaped ears for flask pins and vibrator. Order by flask size, not plate size. It will pay you to investigate this source for quality plates

Some Typical Prices for ⅜" Plates . . . Add 33 1/3% For ½"

10 x 16 . . . 9.90	11 x 18 . . .11.22	12 x 18 . . .11.88	14 x 16 . . .12.18
10 x 18 . . .10.56	12 x 14 . . .10.26	13 x 16 . . .11.58	14 x 18 . . .14.52
11 x 16 . . .10.26	12 x 16 . . .10.86	14 x 14 . . .11.22	16 x 16 . . .14.52

Send for Price List Today—Special Shapes and Thicknesses to Order

ARTHUR E. WILL, 643 West 11th Street, **ERIE, PA.**

CALL HENRY

FOR SERVICE ON

QUALITY GRAY IRON CASTINGS

from ¼lb. to 600 lbs. each

Complete

MECHANIZED FACILITIES

★

Call 31211

Potential Pouring Capacity of 160,000 pounds per day

THE HENRY FOUNDRY DIVISION
MEDINA, OHIO

SHORT CUT TO PROFITS

WELDED AND BOLTED TYPES • ALL SIZES • COMPLETE CONTROL EQUIPMENT • 26 YEARS A LEADER IN MAGNETIC MATERIALS HANDLING.

ohio MAGNETS

THE OHIO ELECTRIC MFG. CO. • 5900 MAURICE AVE. • CLEVELAND, O.

Associate Member Institute of Scrap Iron and Steel, Inc.

A-2752

Mark it with

KORN

METAL MARKING CRAYONS

Permanent markings on all types of hot, cold, wet or dry metals assured with these versatile crayons. Ideal for marking cores. KORN CRAYONS produce superior results under all conditions. Write today for free samples and price list. Inquiries from distributors are invited

Wm. KORN, INC.

260 WEST ST.
DEPT. F, N. Y. 13, N. Y.

BULLARD

GEO. H. BULLARD COMPANY, INC.

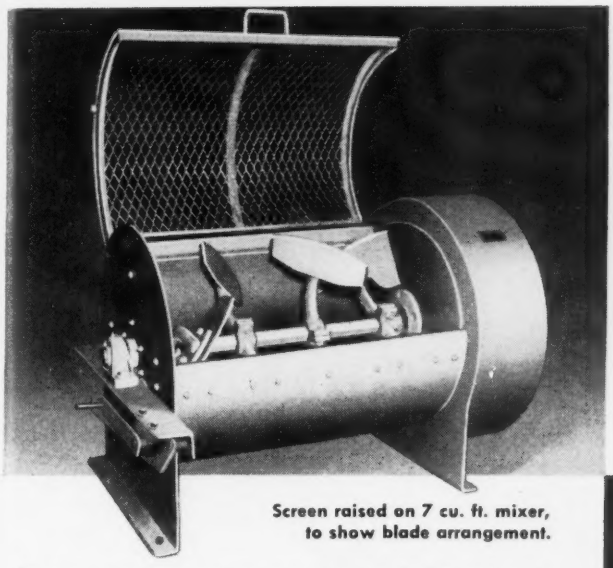
The Specialty Manufacturing Company in the Industry

WESTBORO, MASSACHUSETTS

HIGH SPEED GRINDING WHEELS

CUT-OFF AND COPING WHEELS

WRITE DEPT. F for CATALOGUE and PRICES



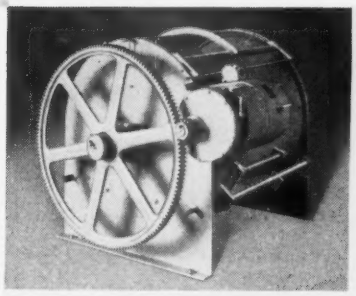
Screen raised on 7 cu. ft. mixer, to show blade arrangement.

For a fast 4-minute mix—

MULTI-MIXER

- With multi-blades for perfect mixing
- Direct drive motor, no clutch or belts
- Wear resistant liners and paddles

Get a fast 4-minute mix and ½-minute discharge for your core and molding sands, and cupola patch mixes. Get a perfect mix too, with the best blade arrangement in any mixer—it cuts, turns, and kneads ten times with each shaft revolution. These trouble-free Multi-Mixers come in capacities from 3 to 60 cubic feet. Larger and special mixers made to our specifications. See your foundry equipment dealer or write us direct.



Rear view of 7 cu. ft. mixer, with gear guard removed, showing direct drive motor. Anti-friction bearings throughout. Quick acting discharge door is operated from the front of the mixer. Mixers are shipped complete, ready to install and operate.

MULTIPLEX MACHINERY CORP. ELMORE OHIO

PRODUCERS CORE SAND CORPORATION

PITS AT MICHIGAN CITY, INDIANA AND SAWYER, MICHIGAN

MICHIGAN CITY, INDIANA

POWDERED GLASS

AN EXCELLENT BRASS FLUX

—Economical—

THE BASSICHIS COMPANY

CLEVELAND 13, OHIO

PURO-SEAL FLUX

for producing BETTER BRASS *and* ALUMINUM CASTINGS

Write for Particulars and TRIAL SAMPLE

PURO SEAL — FOR THE PURIFICATION OF METALS

THE PURO-SEAL COMPANY

3323 WEST 3rd STREET · CLEVELAND 13, OHIO

PHILADELPHIA COKE

PHILADELPHIA COKE COMPANY

4501 Richmond St.

Philadelphia 37, Penna.

PHONE: DELAWARE 6-3100

Producers of

FOUNDRY • METALLURGICAL

INDUSTRIAL COKE

Cut Cleaning Costs with AMERICAN SHOT AND GRIT

Tough American Shot and Grit is designed to be used over and over. American's own manufacturing process assures uniform hardness and size. All sizes graded to SAE specifications. Packed in 100-pound bags.

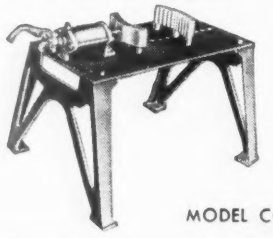
THE AMERICAN STEEL ABRASIVES CO.,
GALION, OHIO
MEMBER FEMA

JOY CASTING GRIP DOUBLES YOUR CAPACITY FOR SNAGGING AND CLEANING

- FASTER
- EASIER
- SAFER

WITH **AIR POWERED JAWS**

GRIPS FIRMLY ANY SHAPE OF MEDIUM SIZE CASTING 2 TO 20 INCHES



MODEL CG-2

Now . . . the operator can clean and snag twice as many castings because no time is lost trying to get a firm hold on the casting. He can bear down with the grinding wheel because the casting can't fly loose, and he won't lose time if the casting gets hot. Castings are gripped slowly and deliberately, but released instantly by the control of one, easy-to-operate, pneumatic valve. ● Investigate JOY Casting Grips—*you can cut costs with them!*

WRITE FOR CATALOG 76-M

WAD 3664

JOY MANUFACTURING COMPANY
OLIVER BUILDING • PITTSBURGH 22, PA.

HOW TO USE THE CUPOLA

NEW 36 PAGE HANDBOOK

$1.00 Postpaid

by Bernard P. Mulcahy, Pres. of Fuel Research Lab. Inc.

13 HELPFUL CHAPTERS ON ALL PHASES OF THE CUPOLA. "How To Use The Cupola" . . . . 13 idea-packed chapters based on the practical experience of a man who has devoted his life to foundry fuel and melting problems. It's a mighty useful handbook—a handy source of information which will pay for itself many times over in the months and years ahead.

Book Department
THE PENTON PUBLISHING CO.
1213 W. Third St. Cleveland 13, Ohio

MILWAUKEE-TESSMER
Sprue Cutter
for
Non-Ferrous Foundries

- Cuts Sprues and Gates with One, Swift, Sure Stroke.
- Does away with tedious hand labor.
- Speeds flow of work through cleaning department.
- Built for years of Rugged, Low-Cost Service.
- 2 Sizes, ¾" and 1¼" square. Built-in electric motor or belt drive.

Write for Illustrated Bulletin

RICE PUMP & MACHINE CO.
222 North 12th Ave. Grafton, Wisconsin

Make Gates Fast with

Mabco FLEXI-GATE

FLEXI-GATE is a revolutionary, new gating material developed to eliminate costly cutting and fitting.

It is a flexible material which may be molded to fit any pattern simply by bending to the desired angle.

FLEXI-GATE Can Save You Money!

FLEXI-GATE has proven its worth in actual production. It has eliminated necessity of cutting gates for each pattern. Flexi-Gate has your pattern into production faster and at less cost.

Write today for further information on this money saving item.

M. A. BELL COMPANY

Dept. AF, 217 Lombard St., St. Louis 2, Mo.

Offices in:

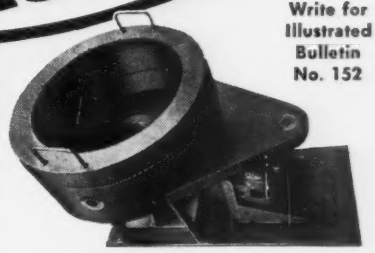
HOUSTON ST. LOUIS DENVER

Serving the Foundry Industry over 25 years

Ideal for

EXPERIMENTAL CENTRIFUGAL CASTING

Write for Illustrated Bulletin No. 152



MODEL J is well suited for experimental work in Aluminum, Iron, Steel and Bronze as well as regular production. Casts bearings, bushings, gears, etc. Accommodates interchangeably both permanent molds or sand molds up to 24" in diameter and up to 12" high.

MODEL J is versatile, sturdy and easy to operate to produce economically a wide range of superior castings. It is completely integrated on a single base, readily moved as a unit, and does not require a special foundation.

Centrifugal Casting Machine Co.

P. O. Box 947 Tulsa 1, Okla.

E. Merideth Hunt

"foundry specialist" in

quality control . . . gating . . . risering . . . porosity problems . . . synthetic or natural molding sand formulas . . . x-ray techniques

E. Merideth Hunt

FOUNDRY SALES & ENGINEERING COMPANY
1006-7 PONTIAC STATE BANK BLDG., PONTIAC, MICHIGAN
PHONE—PONTIAC FEDERAL 4-4508

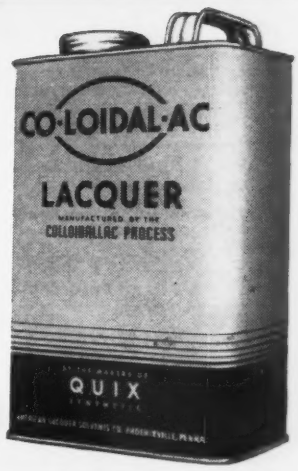
Patterns COME CLEAN

from the sand when they are coated with hard, heat-and-abrasion resistant CO-LOIDAL-AC Lacquer. You will like the improved mold quality obtained and the extra long life of this superior finish.

Direct factory-to-you sales makes possible exceptional value. Available in gallons or drums, clear or colors. Place in trial order today.

WRITE FOR COMPLETE INFORMATION

AMERICAN LACQUER SOLVENTS CO.
Perkiomen Junction, Phoenixville, Pa.



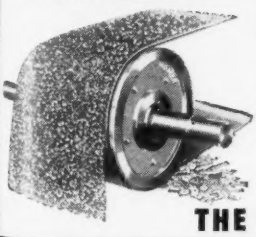
FOR SAND SLINGERS, CONDITIONERS AND CONVEYORS . .

HERE IS THE ANSWER TO YOUR MAGNETIC SEPARATOR JOBS!

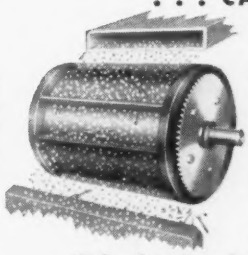
HOMER "Power-Plus" Magnetic Separators

Permanent non-electric—Unaffected by Heat, Cold, Moisture

. . . CAN BE USED INSIDE or OUTSIDE PLANT . . .



Homer MAGNETIC PULLEYS and UNITS —Available in standard diameters from 12" to 30"; belt widths 4" to 60". Special sizes upon order.



Homer MAGNETIC DRUMS—Available in standard diameters from 12" to 30"; face widths 4" to 60". Can be furnished with or without enclosure.

Homer MAGNETIC PLATES—Available in standard widths from 4" to 26"; lengths and number of poles as required. Special fabrications to your specifications.

Write for descriptive bulletins

THE HOMER MANUFACTURING CO., INC., DEPT. 156, LIMA, OHIO

CLASSIFIED ADVERTISING

Help Wanted

SALES ENGINEER

WANTED

Malleable iron castings, gray iron castings. Progressive modernized foundry wants young man who knows Cleveland area. Fine opportunity for young engineer who can sell. Write giving all qualifications, salary expected. Address: Box 170, FOUNDRY, Cleveland 13, Ohio.

BOX 170

FOUNDRY **CLEVELAND 13, OHIO**

GRAY IRON FOUNDRY SUPERINTENDENT

Experienced man capable of taking complete charge of all departments of a long established medium jobbing and semi-production foundry. Must have excellent habits, be qualified to estimate blue prints, set piece work and incentive prices, thoroughly competent in cupola practice, alloying, sand control, rigging for production and able to handle men. Excellent opportunity for the right man. If you are qualified for a position of this kind, write giving references, age, experience and salary expected. Address: BOX 168, FOUNDRY, Cleveland 13, Ohio.

STEEL FOUNDRY MEN

Experienced supervisors in pattern, foundry, core, cleaning, inspection, open hearth and process control required for large government owned defense plant in Chicago area currently engaged in production of armor castings. All levels of supervisors required. Company organizational setup of sufficient size and aggressiveness to afford permanent opportunity to supervisors whose performance proves above average. Address: Box 999, FOUNDRY, Cleveland 13,

---

PATTERN FOREMAN

Experience in metal patterns, cope and drag. For well established Southern firm. Permanent position for right party.

BOX 161

FOUNDRY **CLEVELAND 13, OHIO**

FOUNDRY ENGINEERS AND DRAFTSMEN

Having foundry operating or plant engineering experience. Write, enclosing photograph and complete record of education and experience in detail, including previous employers and length of service. State age and salary expected. ADDRESS: LESTER B. KNIGHT & ASSOCIATES, INC., 600 W. JACKSON BLVD., CHICAGO 6, ILL.

INDUSTRIAL ENGINEER

Specializing in foundry work. Applicant should be free to travel and understand foundry operations. Sketching and time study important. Applicant will be trained in specialized fields. In reply state qualifications, education and enclose recent photo. Address: Box 125, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST

Wanted for supervisory position by aluminum and bronze foundry in Northern Ohio. AAA-1 Co. Address: Box 182, FOUNDRY, Cleveland 13, Ohio.

CHIEF ENGINEER

SALARY $8000—$10,000

Permanent mold and die cast die design experience in light metals required. Man we want has a sound record behind him and has top management ambitions for the future. Bonus plan. Write in detail. Address: Box 121, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRY METALLURGIST

Unusual opportunity available for qualified foundry metallurgist. Interest in and knowledge of modern research methods in foundry field required. Practical foundry experience preferred. Opening calls for person able to accept responsibility in an expanding organization. Excellent possibility for personal and professional growth; good salary; pleasant working conditions.

METALS DEPARTMENT
ARMOUR RESEARCH FOUNDATION
CHICAGO 16, ILLINOIS

EQUIPMENT SALESMEN

Leading manufacturer has several established territories to offer. This company's new policy means an attractive opportunity to future salesmen. Reply stating age, marital status and willingness to travel. Address: Box 180, FOUNDRY, Cleveland 13, Ohio.

MECHANICAL SUPERINTENDENT

Man with wide experience in foundry engineering and maintenance together with considerable administrative background needed to head up plant engineering and maintenance in an extremely large steel foundry in Chicago area. Excellent opportunity for right man to grow in large organization. Address: Box 136, FOUNDRY, Cleveland 13, Ohio.

WELDING ENGINEER

Experienced welding engineer needed for plant in Chicago area currently engaged in production of armor castings. Man with technical and practical experience in welding steel castings particularly low alloy castings. Will have opportunity to grow in large steel casting organization. Address: Box 135, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Thoroughly experienced man in aluminum permanent mold for modern midwest foundry. Magnesium experience helpful. Essentials are ability to handle people and maintain production schedules. Technical background helpful, not required. For a qualified man who probably has at least ten years' experience, salary is open and future unlimited. Bonus plan. Send complete resume in confidence. Address: Box 122, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY FOREMAN

To take full charge of production foundry and grinding room. Must have wide knowledge of the making of small, smooth, leak-proof brass castings in sand molds. Solid and core work. Also be capable of handling men. State full particulars in first letter. Address: Box 186, FOUNDRY, Cleveland 13, Ohio.

GENERAL FOREMAN
NONFERROUS FOUNDRY

With molding experience in making nonferrous castings required; practical experience and ability to handle men is essential. Company in Metropolitan New York area is expanding and there is an excellent opportunity for the right man. In making application state age, where you have worked and what you can do. Address: Box 177, FOUNDRY, Cleveland 13, Ohio.

WORKING SUPERINTENDENT

Unusual opportunity to buy part interest and take over operation as working superintendent of small ferrous jobbing foundry. Excellent future, opportunity for large profits. Iowa city of 30,000. Address: Box 199, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Gray iron job foundry making machine tool and heavy press castings weighing up to 10 ton. Must have excellent record in quality control and labor relations. Also cupola melting and sand slinger operations. Address: Box 171, FOUNDRY, Cleveland 13, Ohio.

GRINDING WHEEL SALESMEN

Experienced men wanted in most territories. Salary or commission basis. Resinoid only. Please state complete facts. Address: CALIFORNIA GRINDING WHEEL CO., INC., 2444 EAST 54th ST., LOS ANGELES 58, CALIFORNIA.

Help Wanted

FOUNDRY PLANT ENGINEER AND

MASTER MECHANIC

Who specializes in preventive maintenance for production in modern grey iron foundry, one of largest in California. Must be thoroughly experienced in all phases of core room, molding, cleaning of production foundry, etc. Salary open. Enclose resume of past experience and letters of recommendation together with photograph. Replies will be held in strictest confidence. All letters will be answered. Expenses paid for interviews.

BOX 174

FOUNDRY **CLEVELAND 13, OHIO**

STEEL MOLDING FOREMAN

Midwestern electric steel foundry would like to hire a competent molding foreman who has had good basic experience in jolt squeezer, rollover jolt stripper and jobbing floor work. Must have the proper initiative, drive and tact in order to obtain a reasonable amount of work from various types of men without the use of incentive pay. Address: Box 145, FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Production gray iron foundry in Midwest. Man 25 to 40 with engineering or foundry sales experience preferred. Address: Box 169, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Opportunity for well qualified man capable of taking charge of melting and annealing departments in modern foundry. Duplex melting—continuous and batch type annealing. Plant located in Illinois. Address: Box 114, FOUNDRY, Cleveland 13, Ohio.

GENERAL FOUNDRY FOREMAN

Large steel foundry in Eastern Pennsylvania has position available for aggressive steel foundryman. Excellent opportunity for advancement. Must have well-rounded foundry experience and be capable of coordinating core room, slinger floors, and dry floor, large casting production, for efficient operation. In reply state age, experience, salary expected and when available. Address: Box 188, FOUNDRY, Cleveland 13, Ohio.

REPRESENTATIVE WANTED

Foundry specializing in aircraft quality magnesium and aluminum castings seeks sales representation in all areas. Prefer man now selling nonconflicting lines. Please write fully. Address: Box 156, FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Wanted that knows the foundry sand business and with foundry experience to call on the foundries in Indiana, part of Ohio and part of Michigan. Address: Box 185, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

WANTED

Good opportunity for experienced and progressive young or middle-aged man in Midwest grey iron jobbing foundry. Must be able to estimate and rig medium and heavy castings, especially machine tool and production work. State age, experience and references.

SORBO-MAT PROCESS ENGINEERS

3938 LINDELL BLVD., ST. LOUIS 8, MO.

SPECIFICATION CAST IRONS

Help Wanted

ENGINEERS

Excellent opportunity with nationally known organization for technically qualified sales engineers located in Michigan and Illinois to sell and demonstrate to foundries in Michigan, Ohio, Indiana and Illinois. Require foundry-experienced men under 40. Salary and commission. Write complete resume including references. Address: Box 202, FOUNDRY, Cleveland 13, Ohio.

ELECTRIC FURNACE MELTER

Acid electric steel foundry, carbon and low alloys. Cleveland district. Address: Box 184, FOUNDRY, Cleveland 13, Ohio.

Accounts Wanted

ACCOUNTS WANTED

Practical foundry consultant. Nonferrous, aluminum, magnesium. Thirty-five years' experience. Trouble shooting, setting up and developing new plants. Reasonable terms. Address: RAYMOND WICKLEIN, 30 MEADOWBROOK PL., MAPLEWOOD, N. J.

SALES REPRESENTATIVE

Man with many years of experience serving metalworking field has decided to operate as a Manufacturers' Agent covering Northern Ohio for one or two well established lines. Interested in lines sold to metalworking including castings, forgings, gears, fasteners and sintered powdered metal parts. Address Box 191, FOUNDRY, Cleveland 13, Ohio.

Foundry Service

SERVICES FOUNDRY CONSULTANT

Announcing a new foundry service. Tell us your troubles. We will give you the best service possible. We guarantee results or no cost to you. Grey iron—hard and soft, brass and bronze, melting, core room, cleaning and sand problems. Cupola operation and repair. Address: Box 181, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

MANAGER OR EXECUTIVE ASSISTANT

Experienced as chief metallurgist of tractor works; production superintendent, sales engineer and works manager of foundry producing heat resistant and stainless castings. Desires position with progressive organization. Address: Box 141, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT

Wide experience gray iron, some nonferrous. To take complete charge of small foundry jobbing or production. Experience covers all types of castings including pressure. Small foundry preferred. Address: Box 172, FOUNDRY, Cleveland 13, Ohio.

GREY IRON FOUNDRYMAN

Available. Capable, qualified and experienced to direct all phases of foundry activities. Light to medium heavy work. Green and dry sand. Well versed in cupola operation and metallurgy. Fifteen years in present executive position. Middle aged. Good appearance. Pleasing personality. Address: Box 603, FOUNDRY, Cleveland 13, Ohio.

ENGINEER

Desires responsible position in foundry production or engineering. Experience in mechanized gray iron foundry as assistant plant engineer, 2 years; plant engineer, 2½ years. Presently employed. Age 30, married. Mechanical engineering graduate. Address: Box 162, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Metallurgical engineering graduate with twenty-nine years' steel foundry experience. Strong in administrative, labor relations, and technical phases of the business. Desires change, position with small or medium size steel foundry preferred. Address: Box 187, FOUNDRY, Cleveland 13, Ohio.

PATTERN SUPERINTENDENT

FULLY EXPERIENCED IN HIGH PRODUCTION EQUIPMENT. OVER 30 YEARS' EXPERIENCE IN DESIGNING AND PRODUCING HIGH PRODUCTION EQUIPMENT. AGE 53. AVAILABLE SEPTEMBER 1st. ADDRESS: BOX 178, FOUNDRY, CLEVELAND 13, Ohio.

FOUNDRYMAN

Twenty-four years all round practical and technical experience—jobbing or production, metallurgy, sand control, aluminum, malleable, gray iron. Salary open. Age 42, married, good health. A-1 references. Address: Box 126, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST-MELTER

Experienced metallurgist and electric melter seeking responsible position with electric steel foundry. Qualified to handle control of melting, laboratory, heat-treat and mold and core mixes and eliminate trouble causes with use of technical, practical and overall foundry knowledge and experience. Address: Box 198, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Technical college graduate, patternmaker qualified to design production pattern equipment, core equipment and hydraulic press straightening dies. Practical experience in sands, molding, coremaking, gating and risering, pouring, scrap analysis, annealing, cleaning and finishing of malleable and gray iron castings. Age 43. Desire change for personal reasons. Address: Box 193, FOUNDRY, Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT

Desires position with small or medium nonferrous jobbing or production shop in Los Angeles area. Fifteen years' experience all phases. Top references. Married and steady. Age 32. Address: Box 998, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Desires position as foreman or superintendent gray iron or nonferrous. Practical man, 26 years' experience in production and light jobbing shops. Address: Box 183, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Graduate engineer—14 years' experience in high production grey and malleable iron foundry. Practical working knowledge of all foundry operations. Well versed on pattern design, scrap analysis, inspection and core and molding problems. Will consider any job capable of doing, domestic or foreign. Address: Box 194, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERVISOR

A graduate metallurgist with experience in steel, gray iron and brass. Forty years of age. Have had managerial experience and am desirous of becoming associated with progressive firm. Address: Box 176, FOUNDRY, Cleveland 13, Ohio.

PATTERNMAKER

First class wood metal patternmaker. Forty years' experience master work models, machine tool patterns. Capable of running small shop, work bench, estimate work or charge of large shop. Years' experience on work that saves money on castings by making pattern and core work and producing castings at low cost. Address: Box 158, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM FOREMAN

Twenty years' experience core room foreman in steel and grey iron (15 years as general foreman). Supervise production by machine and core blowers for high production. Cost minded. Address: Box 189, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY SUPERINTENDENT

Fully qualified on large and small machine tool castings in gray iron. Good record on quality control, organizing ability, production and costs. Up to date on sand, metal and mechanization. Prefer foundry with over 200 men. Now employed. Address: Box 117, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER

Twenty-six years in machine tool foundries. Experience covers all foundry operations. Specialized knowledge of foundry cost control, incentive systems, industrial relations, production methods and organization. Foundry consultant on sand and quality control, mechanization, cupola operation and general foundry problems. Age 42, now employed. Address: Box 797, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST

Ten years' practical experience in cupola melting. Well versed in alloying, chill control work, chemical and physical testing. Also experienced in electric furnace melting. Prefer position that is permanent with a future and educational. Age 29—very good references. Address: Box 197, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

MANAGER—SUPERINTENDENT

Twenty-eight years of gray iron experience and some nonferrous. Outstanding practical and technical background. Have supervised as many as three hundred men, 125 tons daily, production and jobbing, mechanized or semi. Excellent cost man, ability to handle men and can obtain results. Age 47. Address: Box 991, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT

Desires position as superintendent of light to heavy jobbing or semi production iron foundry. Age 43, practical and technical training. Well versed in all phases of the foundry. Address: Box 201, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY MANAGER OR SUPERINTENDENT

Practical progressive foundryman—30 years' experience gray iron, semi-steel and malleable. Capable of taking complete charge all phases of any foundry—cost, sales, estimating, rigging for production and reduce scrap. Very cost minded. Last 15 years in executive capacity. Address: Box 195, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY ENGINEER

Graduate—12 years of jobbing and production foundry experience, both light and heavy work in grey iron steel and malleable. Some nonferrous. Work has been mainly in rigging, trouble shooting, iron melting and plant engineering covering equipment planning, installation and maintenance. Presently employed but desires change—references. Any location considered. Address: Box 164, FOUNDRY, Cleveland 13, Ohio.

WEIGHT ESTIMATING

Estimating of casting weights furnished by return mail. Accurate, reliable and confidential service. Automatic calculator equipment. Nominal fee. Send blueprints to: CHARLES E. ROLAND, ITASCA, ILLINOIS.

BUSINESS MANAGER

Mature, profit-minded, aggressive. Successfully managed five companies—three taken out of the red. Trained two successors, both made good. Qualified to carry complete administrative responsibility and develop all profitable possibilities. Excellent experience foundry, machinery and related lines. Address: Box 112, FOUNDRY, Cleveland 13, Ohio.

MOLDING FOREMAN

Twenty-eight years' experience, 21 years at the trade, 7 years supervision. Gray iron, steel and nonferrous. Hard worker, cost minded, specializing in production of sound, quality castings. 49 years of age, good health. Permanent position desired. Address: Box 203, FOUNDRY, Cleveland 13, Ohio.

Opportunity

MATCHPLATES

Have equipment to make pressure cast plates, core boxes and precision castings. Want someone interested in this work who can operate shop with foundry or patternshop. Have the experience to produce work. Address: Box 159, FOUNDRY, Cleveland 13, Ohio.

OPPORTUNITY

PATENT AND PROFIT from your invention. Details concerning our prompt, efficient service. Record of Invention Form, list of needed inventions sent free. Address: INVENTORS BUREAU, 208F CLINTON AVE., OAK PARK, ILL.

OPPORTUNITIES

Expanding Illinois Aluminum foundry offers excellent opportunity for active participation in ownership to permanent mold designer with excellent qualifications and experience and a desire to build on a worthwhile enterprise.

BOX 190
FOUNDRY CLEVELAND 13, OHIO

PATTERNMAKER

With 25 years' experience desires connection that would provide the opportunity of developing unit for high speed production of small sand castings. Address: Box 196, FOUNDRY, Cleveland 13, Ohio.

CLASSIFIED ADVERTISING

Employment Service

Employment Service

EMPLOYMENT COUNSEL, INC.

"All The Name Implies"

JOHN COPE, Manager Foundry Dept.

Recruiting men for employers in the foundry industry throughout the nation. Openings in Steel, Malleable, Gray Iron and Non-Ferrous—Jobbing and Production. Salaries to $20,000.

PLANT MANAGERS	SUPERINTENDENTS
GENERAL FOREMEN	MOLD FOREMEN
CORE FOREMEN	MELTING FOREMEN
CLEANING FOREMEN	MAINTENANCE FOREMEN
PATTERN FOREMEN	METALLURGISTS
INDUSTRIAL ENGRS.	TIME STUDY ENGRS.

And all other Administrative and Sales Positions.

WRITE or CALL for registration.

Completely Confidential

SUITE 500
CHICAGO 2, ILLINOIS

7 WEST MADISON ST.,
FINANCIAL 6-2100

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

SALARIED POSITIONS

$3,500 to $35,000. We offer the original personal employment service (established 42 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. Address: R. W. BIXBY, INC., 101 DUN BUILDING, BUFFALO 2, NEW YORK.

Available Capacity

OPEN CAPACITY

Pattern shop complete service. Prompt delivery, first class work. Location Michigan. Address: Box 160, FOUNDRY, Cleveland 13, Ohio.

PATTERNS

Accurate mahogany masters-working patterns and metal production equipment at lower Canadian prices. Excellent clientele—good rating—inquiries solicited.

GUDGEON BROS. LIMITED
PATTERN MAKERS—PATTERN ENGINEERS
399 VANCOUVER ST. LONDON, CANADA

Wanted-To-Buy

WANTED TO BUY

1—Reddy Sandy with vibrating shakeout deck.
1—2 Station Handy Sandy.
1—SPO 413D jolt squeeze, rollover draw.
1—Low pressure gas fired aluminum or brass furnace #200 crucible.
1—Aluminum gas fired holding furnace.
All items wanted in excellent condition.

BOX 173
FOUNDRY CLEVELAND 13, OHIO

WANTED

Beardsley & Piper speedmullor. Give age of machine and models you have available. Address: Box 153, FOUNDRY, Cleveland 13, Ohio.

PATTERN SHOP

Small or medium size shop, doing both wood and metal work. Give full details first letter. Number of men, type of work and location. Address: Box 179, FOUNDRY, Cleveland 13, Ohio.

WANTED

1—#4 U. S. Rotary melting furnace complete, capacity 2000 lbs. Brass. Address: IMPERIAL CANTRELL MFG. CO., JELLICO, TENN.

GRAY IRON FOUNDRY WANTED

Must be in Chicago or immediate Chicago area. 15,000-20,000 sq. ft. floor space. Will consider any building suitable for foundry operation. Address: Box 175, FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

Used laboratory equipment for steel foundry. 1—tensile and bend testing machine. 1—10' x 12' sand blast room. Must be complete with shot cleaning and shot return system. Address: Box 144, FOUNDRY, Cleveland 13, Ohio.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

WANTED

SANDSLINGER WANTED—Junior Tractor. Address Box 656, FOUNDRY, Cleveland 13, Ohio.

WANTED

BRIDGE CRANES

ARNOLD HUGHES COMPANY

765 PENOBSCOT BLDG. DETROIT 26, MICH.

WOODWARD 1-1894

WANTED

Need for production—Simpson Mixer, Raymond Mill, one or two vibrating screens. Please give full particulars. P. O. BOX 1351 CHURCH STATION, NEW YORK 8, N. Y.

WANTED TO BUY

Patterns for all types and designs of ornamental cast iron work. Send photos, drawings, descriptions with price desired. Address: BELSON MANUFACTURING CO., 111 FRANKLIN ST., AURORA, ILLINOIS.

Foundries For Sale

WILL MERGE OR SELL ACTIVE ALUMINUM PERMANENT MOLD FOUNDRY

Available—Aluminum Permanent Mold Foundry with Tool and Die Shop, near Chicago. Established over six years in forty-five hundred square feet of favorably leased fire-resistant space, with reinforced concrete floors, city water and sewage. Adjacent to railroad siding and truck headquarters. Complete equipment in good working order. Gas fuel. Additional work force available. Comfortable backlog of orders for castings from number of large customers. Low overhead and break-even factors.

Might consider becoming captive to manufacturer who can use entire output or merger, thus freeing up present owner from whom prior responsibility demands more time. Open to ideas.

Cash consideration for Capital Stock would be $25,500, or for fixed assets, deferred charges, Good Will, etc. $29,000, plus value of inventory at time of sale.

For further details concerning this excellent opportunity address

BOX 166
FOUNDRY CLEVELAND 13, OHIO

Foundries For Sale

SMALL FOUNDRY FOR SALE

On New York Central Railroad side track in Lockport, New York. Floor space of molders approximately 11,000 square feet with exceptional dumping ground for disposal of slag and waste indefinitely at lowest expense over declivity on the land. Considerable foundry equipment thrown in for the price of assessed value of the real estate. Address: JEFFERSON UNION COMPANY, LOCKPORT, NEW YORK.

FOR LEASE

Going gray iron foundry for lease in Central Wisconsin. Purchase inventory. Option to buy. Good setup. Address: Box 200, FOUNDRY, Cleveland 13, Ohio.

For Sale

FOR SALE

1—Pedestal Grinder with 5 HP. Motor
1—Covered Worm Geared Ladle, 1000 lb. cap., made by Modern Equip. Co.
1—Whiting Slag Ladle
1—Worm Geared Covered Ladle, 400 to 600 lb. for Pouring Device
1—10 Ton Whiting Worm Gear Ladle
2—1000 lb. Worm Gear Ladles
1—7 Ton Worm Gear Ladle
50—Ladles from 200 to 1000 lb. cap.
2—Mixing Ladles U Type, 3000 lb. capacity
7—Pouring Devices FA-9
1—JFL International Power Jolt Foot Lift Machine
1—JDP. International Jolt Stripper, 600 x 8
1—International "G" Machine 20 x 8
1—Osborn Bumper 24 x 36
1—International Jolt Squeezer
1—#42 Osborn Core Rollover Machine
1—Arcade 20 x 8" Hand Rollover Power Jolt Foot Draw Machine
1—International HJ. 20 x 4" Machine
1—International HJ. 20 x 6" Machine
1—24" Electric Riddle
2—20" Gyratory Electric Riddles
3—Universal Electric Riddles.
1—American Sand Cutter Machine Size 89/70 M
1—Sprue Cutter, with 2 HP. Motor
1—36 x 54 Late Model Whiting Tumbling Barrel complete with Jones Speed Reducer & 7½ HP. Motor
1—Jeffrey Sand Conditioner
1—Simplicity Sand Conditioner
1—Model "M" Beardsley & Piper Screenarator
1—Model "S" Beardsley & Piper Screenarator
1—Wells Metal Band Saw Type 9M42
1—General Blower, 3 HP. Motor, 16 oz. pressure, 220 or 440, 3 phase, 60 cycle, 375 CFM
83—Set Truscon Pressed Steel Flasks, 15 x 20, S Cope, 3 Drag
1—#1 Demmler Core Blower
1—Fairbanks Scale, 500 lb. capacity, movable platform
2—New Carbide Furnace Covers, 30" diameter, 8" hole
1—Sand Blast Generator Tank
2—Grinders
1—Sander
2—Elec. Drills
Other equipment too numerous to mention.

HAYNES FOUNDRY EQUIPMENT
814 ADA ST., KALAMAZOO 52, MICH.

FOR SALE

(2) Bartlett & Snow Car Type Mold Conveyors 113 cars each; 228 ft. center to center; 60 ft. wide; speed—4 ft. to 8 ft. per minute; almost new condition.
Price ..... $9,700.00 Each
New price of the conveyors is $22,000.00 each.

BALCHER MACHINERY COMPANY
1884 S. Compton Road
Cleveland Heights 18, Ohio
Telephone: FAirmount 1-1186

FOR SALE

1—Detroit Electric furnace type L F Y 1175 K.W.—700 lb. New July, 1951. Used three months.

KLUTTZ MACHINE & FOUNDRY CO.
GASTONIA, N. C.

For Sale

FOR SALE

MOLDING MACHINES
8—13 x 8 Tabor power squeeze flask lift machine split pattern type.
1—International 14 x 8 jolt rollover draw.
2—Deuscher Stationary jolt squeeze.
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers.
BLOWERS FOR CUPOLAS AND FURNACES
2—15 HP Spencer-Turbine 2250 CFM at 16 oz.
10—High temperature blowers 1400° F. 9000 to 15000 C.F.M.
1—Connorsville rotary blower 22 x 66 45 cu. ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.
METAL MELTING EQUIPMENT
5—1000# open flame brass melting furnaces, gas fired.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
New 32" to 41" dia. shell cupolas made to order.
TUMBLING MILLS AND SAND BLAST
1—Pangborn Sand Blast Unit, including generator tank, shot cleaner, bucket elevator. Suitable for use with room.
MISCELLANEOUS
1—Sullivan WG6 11 x 10 50 HP air compressor,
1—Stoney crane type shakeout.
1—Dings type M magnetic separator.
1—NC-4 sand separator.
1—NB-2 sand separator.
1—#1 Demmler core blower.
2—#16 Roto-clone units complete.
25 Tons steel flasks in sizes from 26 x 26 to 60 x 60.
4—Heavy Duty Flexible Shaft Grinders 2 HP.
Complete stock of rebuilt mill and dust exhaust blowers.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE

2 Simplicity Shakeouts 3' x 5', new in 1948. Used very little.....$ 650.00
1 Howe Platform Scale, 4' x 5', 4,000 lbs capacity, electric .....$ 350.00
1 Simplicity Shakeout, 3' x 3'.....$ 550.00
5 Lewis-Sheppard Jack Lift trucks, 4,000 lbs capacity, Hydraulic, new 1950.....$ 150.00
1 Automatic Transporter, Electric, 4000 lbs capacity, recently rebuilt.....$ 375.00
1 Power Hammer, Little Giant, Model #X-004. Size 50 lbs, never used.....$ 350.00
1 G.E. Industrial Battery Charger.....$ 175.00
1 Roll 200' 18", 7 ply, 35 oz duck, ⅛" x ½" rubber covered. NEW .....$ 700.00
1 Roll 400' 30", 6 ply, hot sand belt, ⅛" x ½" rubber covered. NEW.....$1600.00
LARGE ASSORTMENT OF HINES ALUMINUM POP OFF FLASKS AND JACKETS, NEW AND USED, PRICED LOW.

AAA SALVAGE COMPANY
856 EDDY ROAD CLEVELAND 8, OHIO

AMERICAN SAND CUTTER—FOR SALE

$950.00—Six ft.; wired for 220 or 440 volts; 3 phase 60 cycle. Model K, excellent condition with extra new spare parts. Address: RAPIDS FOUNDRY & ENGINEERING INC., 832 OTTAWA AVE., N. W., GRAND RAPIDS 2, MICHIGAN.

FOR SALE

1000 POUND CYLINDRICAL LADLE

Made by Modern Equipment. Geared and covered. Used for only 2 heats. Like new.
STEARNS MAGNETIC PULLEY SEPARATOR Complete with rectifier, 12" dia. pulleys, 12" wide belt. Pulley on 10' centers. Good condition. Reasonably priced.

IROQUOIS FOUNDRY COMPANY
1600 LAYARD AVENUE
RACINE, WISCONSIN

FOR SALE

1—Pangborn 12' diameter type "LB-2" air blast rotary table machine with four oscillating nozzles, having a work surface area of 93.5 sq. ft. capable of handling a piece up to 26.6 sq. ft. in area x 1'11" high. Table complete with abrasive handling and reclamation equipment, motors and controls, 3 phase, 60 cycle, 220 volts. Also complete with cloth screen dust collector system to serve same. Operating daily. Price ....$3000.00. Address: CALORIC STOVE CORP., TOPTON, PENNSYLVANIA.

For Sale

FOR SALE

Motors, Generators, Transformers from 1 HP to 2500 HP
World headquarters for T.E.F.C. and explosion proof motors.
World's largest inventory.

ELECTRIC EQUIPMENT CO.
ROCHESTER, N. Y.

FOR SALE

Used Stroman Model R, 6,000 lbs. iron melting or duplexing furnace, gas fired. 400/3/60. Motors and controls for chain drive pouring and blowers. Recently used for copper base alloys. Excellent condition. Address: AMPCO METAL, INC., 1745 S. 38th ST., MILWAUKEE 46, WISCONSIN.

FOR SALE

1—International type PK Jolt Squeeze Pin Lift 18" cylinder, 8" lift
1—International Plain Jolt—18" x 24" Table
1—Champion Core Roll-over, 16" x 8", Portable
1—1-ton Gear Ladle
1—3 HP Stand Grinder
1—2-ton Lo-Hed Hoist, 220 V., D.C.

RAY P. SCULLY
SCULLY MACHINERY & EQUIPMENT CO.
767 MILWAUKEE AVE. CHICAGO 22, ILL.
PHONE: CANAL 6-0314

FOR SALE

15 ton Herault Electric Furnace Complete $35,000.00
60' Vertical Tower Core Oven Carrier size 24 x 81 ..... 10,000.00
Stroman Aluminum Reverberating Furnace-hydraulic tilt & loader ..Open for offer
#918 Johnston & Jennings Jolt, Rollover & Pattern Draw Molding machine; table size 44" x 54"; no pit necessary 1,500.00
Herman Hi Speed Rollover & Pattern Draw Molding machine; 1500 lb. series; table size 36" x 48" 1,500.00
(2) REJ International jolt, squeeze, rollover, and draw molding machines; 800 lb. capacity; used very little .....Ea. 1,100.00
#91 Osborn Core Blower, with clamps 650.00
Beardsley & Piper Turntable—16'; with 6 Champion Push Off machines .. 3,500.00

BALCHER MACHINERY CO.
1884 S. COMPTON RD.
CLEVELAND HEIGHTS 18, OHIO
FAirmount 1-1186

FOR SALE

14 SPO and Osborn 275J Portable Jolt Squeezers.
2 6' Simpson Mixers.
2 Wheelabrators.
1 Johnson & Jennings 815B Jolt Rollover.
Melting Furnaces ALL KINDS.
CORE OVENS.
4 SANDCUTTERS.
Core Plates FLASKS.
ROLLER CONVEYORS.
SEND FOR LATEST 5 PAGE FOLDER.

UNIVERSAL MACHINERY & EQUIPMENT CO.
320 E. BROAD ST., SHILLINGTON
30311 READING, PA. 40146
R. B. HARRISON, MANAGER FDRY. DIVISION

FOR SALE

36" x 46" AMERICAN WHEELABRATOR TUMBLAST CLEANING MACHINE.
SALE PRICE INCLUDES SPARE PARTS. MACHINE WAS BOUGHT IN FEBRUARY, 1949 AND IS IN GOOD CONDITION.
FOR FURTHER INFORMATION WRITE OR CALL

SLEEVE CASTINGS PLANT
PERFECT CIRCLE CORP.
RICHMOND, INDIANA

MACHINERY FOR SALE

2—Johnston & Jennings Jolt Pin Lift, Molding Machines, 30" x 36" table, 10" draw. ADDRESS GOLD FOUNDRY & MACHINE WORKS, 1618 SOUTH OSAGE ST., INDEPENDENCE, MO.

For Sale

FOR SALE
TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
4500	16 oz.	G.E.	675	16 oz.	Spencer
4000	32 oz.	Spencer	660	20 oz.	A-B
4000	16 oz.	Spencer	650	16 oz.	Spencer
3500	40 oz.	Spencer	500	10 oz.	No. Am.
2800	1 oz.	Spencer	400	4.3 oz.	Spencer
2700	16 oz.	No. Am.	400	16 oz.	Spencer
2700	16 oz.	Spencer	340	20 oz.	A-B
2500	7 oz.	Sturt.	320	12 oz.	Spencer
2200	16 oz.	No. Am.	225	16 oz.	Spencer
2000	16 oz.	Spencer	180	15 oz.	Spencer
2000	2½ oz.	Spencer	9100	7" SP	Sturt.
2000	1 oz.	Spencer	1100	4½" SP	Bayley
1150	20 oz.	No. Am.	100	7" SP	Spencer
800	8 oz.	No. Am.			

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FLASKS

Sterling	Wheelbarrow	Rolled Steel
15 sets	46 x 50	6" cope, 6" drag
15 sets	38 x 44	6" cope, 6" drag
15 sets	32 x 48	6" cope, 6" drag
15 sets	32 x 48	6" cope, 8" drag

Condition: like new. Priced right.
JOLT-STRIP MACHINE, Herman mfg., 6000# series, 48 x 54 table, 12" draw. Late model, exc. cond. $2,500.00 f.o.b.

ALLIED MATERIALS HANDLING CO.
4657 SPRING GROVE CINCINNATI 32, O.

FOR SALE

30—Sets Flasks, 17" x 19" Cope and Drag, 22½" Pin Centers. Bars in Cope and Drag.
50—Sets Round Flasks, 15" Dia., 4" Cope and Drag, 18" Pin Centers. Bars in Drag.
100—Sets 18" Round Flasks, 4½" Cope with Bars, 5¾" Drag with Bars, 24¼" Pin Centers.
1—Baker-Perkins Mixer.

CHESANING PIPE COMPANY
CHESANING, MICH.

FOR SALE

ROTOCLONE #36, wet type, 34,000 CFM 3 inch T.P. Complete, with GE 100 hp T.E.F.C. Motor.
DYNAMIC PRECIPITATOR #24 (Dust Collector), wet type, 13,084 CFM at 3.9 SP. Mfg. Am. Air Filter Co., type W. Complete with 50 hp Motor.
BLOWER, Low Pressure, Cent. type for Exhaust, Mfg. U. S. Air Cond., 36,000 CFM at ¼" SP. Complete with 15 hp T.E.F.C. Motor. Above three units in excellent cond., can be purchased with or without motors.

ALLIED MATERIALS HANDLING CO.
4657 SPRING GROVE CINCINNATI 32, OHIO

FOUNDRY EQUIPMENT
FOR SALE

1—International Molding Machine Size 14", Serial #70212, Type JSK-7. In excellent condition. Will sell for $2100.00.
1—Sly Tumbling Barrel 48" Dia. x 12 ft. with 40 H.P. Motor. Price $750.00.
1—Jeffry Sand Handling Unit. Not assembled. Capacity 30 Tons per hour. Price $3000.00.

THUNDER BAY MFG. CORP.
ALPENA, MICH.

FOR SALE
SAND BLAST EQUIPMENT

Wheelabrators-Tumblast size 48 x 42
Hurry, 4 more have been released for immediate sale priced 4 to $5000.00.
Wheelabrator 4 Ft. Table Blast w/tables $1750.00
Wheelabrator 27 x 36 Tumblast good condition—rubber belt $3000.00.
Pangborn 1GF Air Tumble Bbl. 150# load cap.
Pangborn ES-207 Blast Cleaning Cabinet used for strip steel or bar stock $1750.00.
Pangborn 8 ft. table with 7 28" tables $4000.00.
Pangborn 7GK5 rocker barrel.
Pangborn 3½ GK2 rocker barrel.
Sand Blast room 10 x 10, reasonable.
Sand Blast Cabinets, pressure tanks, dust collectors and blowers. All sizes.
Contact us for your sandblasting needs or any surplus sandblasting parts and equipment you have for sale.
Will accept your small machines as trade in on any of the above equipment.

DIAMOND SALES INC.
5654 WEST JEFFERSON
DETROIT 9, MICHIGAN

FOR SALE

One 100 KW Westinghouse transformer, 22000 volt primary 115-230 volt, three wire secondary. Address: FORT PITT STEEL CASTING CO., McKEESPORT, PA.

CLASSIFIED ADVERTISING

For Sale

FOR SALE

Simplicity gyrating screen, 3' x 8' "SS" 1 deck low head. Factory rebuilt—excellent condition. Complete with right hand V-belt, less motor.

SLINGER FOUNDRY CO., INC.
SLINGER, WISCONSIN

STEEL PLATES

35,000 lbs. of 1⅜" Hot Rolled Alloy Plates 57½" to 78" by 73" to 238". Perfect for use as Foundry Floor plates, mines, quarries, and steel plants.
Priced exceptionally low for anyone needing cheap heavy plate.
Wire - - - Write - - - Call - - -

EASTERN STATES STEEL PRODUCTS CORP.
36 COOK STREET
EAST BRIDGEWATER, MASS.
TEL. EAST BRIDGEWATER 8-3133

FOR SALE

PATTERNMAKER'S LATHES
One Fay & Scott 16" swing, 6 foot bed with compound feed and indexing head in A-1 condition $450
One Blaisdell 24" swing, 8 foot bed with compound feed in first class condition..... $450
Both above complete with inside and outside faceplates and tools.
Five molding machine plates ¾" thick, 13½ x 15½" with 2 x 5 ears..... $10 each

THE ATLANTIC WORKS
370 ATLANTIC AVENUE
BOSTON 10, MASSACHUSETTS

FOR SALE

One—#3 Wheelabrator multi table suitable for cleaning furnace or other large type castings. Good condition—not an old machine. Price $6000.00. Address: E. D. COOK, HENRY FURNACE CO., MEDINA, OHIO.

For Sale

FOR SALE—STACK MOLDING MACHINE

1—International type JSK-7 jolt squeeze pin strip molding machine. Practically new and in excellent condition, used less than three months. Also, 60 aluminum stack flasks for same, size 13" x 26" x 3".

VESTAL STOVE COMPANY
SWEETWATER, TENNESSEE

FOR SALE

ONE BEARDSLEY & PIPER MOTIVE JR. SANDSLINGER. OLD MODEL. ONE AMERICAN SAND CUTTER. BOTH MACHINES USED DAILY. COME SEE THEM IN OPERATION. ADDRESS: **LATROBE FOUNDRY, MACHINE & SUPPLY CO., LATROBE, PENNSYLVANIA.**

FOR SALE OR LEASE

Gray iron foundry. Anniston, Alabama territory, 22,000 sq. ft. with #5 cupola ready to operate. For further information address: Box 131, FOUNDRY, Cleveland 13, Ohio.

FOR SALE—AIR HOISTS

Ingersoll-Rand type D, 4,000 lb. capacity, 25' lift, perfectly reconditioned, new equipment guarantee, price $525.00. Address: HAYNES EQUIPMENT CO., INC., 144 FULTON ST., NEW MILFORD, N. J.

FOR SALE

One #42 Newton cupola, 42" diameter shell, 35' high, 13' from bottom of legs to bottom of charging door. Excellent condition. Address: LOOMIS MACHINE CO., P.O. BOX 904, TIFFIN, OHIO.

FOR SALE

1—No. 4 A section Whiting Cupola with all the parts except the stacks—never installed

1—Plain-Jar, Poser Draw Type Machine #28144 with adjustable Flask Lifting Pins—New

1—Magnetic Separator for Brass Borings
1—Type B M 75887 Sandblast Cabinets Size 20

FRANK R. WESTWOOD
6398 THOMAS
PHONE FLEMING 2264
KANSAS CITY, MO.

FOR SALE

4 COAL CONVEYORS—portable Kewanee, 30' long, motorized elec., 2 are self propelled. Late Models—priced low.

ALLIED MATERIALS HANDLING CO.
4657 SPRING GROVE CINCINNATI 32, O.

FOR SALE

1—Beardsley & Piper stationary speed slinger, with 12 ft. first jib 10" belt, complete with hydraulic control equipment, joy stick and ramming units—less motors. In good condition, new in 1946.

BOX 192
FOUNDRY CLEVELAND 13, OHIO

FOUNDRY LIQUIDATION

We must move the following equipment, at once. All equipment located at St. Paul, Minnesota, new 1946 or later.

BLOWERS and FANS

Spencer Turbo Blower 4500 cfm @ 32 oz. Serial 44788, 220/440, 60 hp, G.E. Triclad Induction Motor. New Dec. 1946. Today's cost $3784.00. Our Price $2,250.00
Robbins & Myers Fans. 1/3 of new cost.
1—24" wall mount high speed exhaust fans. Our price $75.00.
1—30" wall mount high speed exhaust fans. Our price $100.00
1—36" wall mount high speed exhaust fans. Our price $150.00
4—48" DC48C7 roof mount with auto. dampers and stacks. New price $939.00. Our price $325.00
2—60" DC60C7 roof mount with auto. dampers and stacks. New price $1065.00. Our price $375.00

BRIDGE CRANES AND MONORAIL

2—15' span one ton American Monorail Bridge Cranes with American Monorail rubber tired drive. Our price $300.00
1—12' American Monorail 1 ton bridge. Our price $50.00
1—15' American Monorail 1 ton bridge. Our price $50.00
1—17' American Monorail 1 ton bridge. Our price $50.00
1—Sand Carrier 2000# Electrolift double hoist carrier for lift with American Monotractor travel unit. Bucket has power dump with 75' American 401 Monorail track. Our Price $450.00
1—Electrolift Hoist Carrier 2000# and American Monotractor similar to above without dump bucket or monorail. Our Price $350.00
1400' American 401 Monorail with #407 hangers and some hanger rods. Our price $0.75 a foot. 90° curves—90° short series curves, right hand switches, left hand switches, 2 way tongue switches, automatic air operated cross track switches, 3 way rotary switch. Write for prices.
Approximately 300 American Monorail #189 4 wheel trolleys. Our price $3.00 each

CLEANING ROOM EQUIPMENT

2—72" x 42" dual operated tumbling barrels. 15 hp 220/440 motor Reeves drive, clutch control. Our price $1000.00 the pair.
1—54" x 36" dia. tumbling barrel, 7½ hp. Westinghouse motor, Cleveland reduction drive. Our price $450.00
1—Pangborn Cloth Screen Type Dust Collector CK4341 5 hp. 1750 rpm, 220/440 Louis Allis motor. Today's new price $1222.00. Our price $350.00.

CORE BLOWERS

2—Demmler 3E Drop Away Draw Type, Serial Nos. 1672, 2252. Today's cost $2190.00. Our Price $1000.00 each.
1—Redford Cartridge type 4" bench blower. New 1946. Today's cost $310.00. Our Price $75.00

HOISTS

12—Ingersoll Rand 2000# Model C Air Hoists, Serial numbers between 46,000 to 59,000. Present cost $585.00. Our Price $250.00 each.
1—Chicago Pneumatic 3000# Air Hoist. Our Price $300.00
3—Electrolift 2000# Electric Hoists, 3 hp, G.E. motors 220/440 v. Our price $250.00 each

MOLDING MACHINES

2—Champion Pin Pushoffs 32" x 36" x 8" draw. Serial Nos. 5609, 5671. New 1946. Today's new price $1365.00. Our Price $650.00 each.
2—Champion Pin Pushoffs 46" x 46" x 12" draw. Serial Nos. 7038, 7039. New 1946. Today's new price $2230.00 Our Price $1250.00 each.
2—Johnston & Jennings Jolt Pin Pushoffs 8" jolt cylinder 12" draw. Today's new cost $1650.00. Our Price 1 @ $800.00, 1 @ $500.00
1—International Type F Jolt Rollover Pattern Draw flask size 45" x 30". 27" x 12" draw air clamp. New price $3605.00. Our Price $1800.00
1—Johnston & Jennings 682—30" x 42" pattern plate 12" draw. Serial 5820-218. Today's new price $1650.00. Our Price $800.00
1—Johnston & Jennings 815B Jolt Rollover Pattern draw 30" x 40" table. Today's new price $3450.00. Our price $1500.00
1—SPO 3102 Jolt Pin Lift 2500# capacity 12" lift, 38" x 52" table. Serial 122. Used less than one month. New June 1950. Present cost $3295.00. Our Price $2100.00

SPACE HEATERS

3—Dravo 1,650,000 B.T.U. catalog 165, DMC20 1635 with #17255 Hauck Oil Burners with Fire Eye Flame Control, 20hp Westinghouse Linestart induction motor for blower. These units were designed for natural gas, converted to oil and may be reconverted to gas. Price today $3900.00. Our Price $1500.00

YARD CRANE

1—Buckeye ¾ yard crane with clamshell bucket and 45" magnet and Kohler generator. Our Price $6500.00.

Above prices F.O.B. St. Paul, Minnesota

ROBERT O'CONNOR, *Liquidator*

126 S. Clinton St. Chicago 6, Ill. Phone ANdover 3-3430

PUBLIC AUCTION SALE
MODERN FOUNDRY EQUIPMENT, OVERHEAD ELECTRIC CRANES

Formerly the Property of

DETROIT STEEL CASTINGS COMPANY

4069 Michigan Ave. Detroit, Mich.

(Entrance and Parking Lot 2940 Scotten Ave.)

TUESDAY, AUGUST 5TH AT 10:30 A.M. (EST)

Sandslingers: 300 C.F. Beardsley & Piper Mobile Sandslinger; 2—Beardsley & Piper Super Double Belt Stationary Sandslingers.

Mullers & Mixers: 2—#60 Beardsley & Piper Speedmullers; Model H Style B3 and #2 Simpson Intensive Mixers; Core Sand Handling System; Sand Conditioner and Dryer.

Castings Cleaning Equip: 48"x72", 48"x48" and 36"x42" American Wheelabrator Tumblasts; Sly and Pangborn Sand Blasts; 2—36"x72" Royersford Tumbling Barrels.

Shakeouts: 3'x8', 5'x6', 4'x8' and 3'x6' Simplicity Shakeout Machines.

Molding Machines: 28—Jolt and Rollover and Jolt Squeeze and Strip Moulding Machines, i.e.: 36"x40" and 32"x40" Johnston & Jennings; 40"x96" and 40"x66" Herman; #193-12, #193-4 and 123-10 Milwaukee, #214 Osborn, Etc.

Ladles: 18—1,000# to 10,000# Teapot, Bottom Pour and Lip Pour Ladles.

Cranes, Hoists: P & H, Northern and Browning Overhead Electric Traveling Cranes, 5-ton to 30-ton, 45' to 75' Span; 230 Volt, D.C.; Also 20—1 to 5-Ton Jib Cranes; 40—Pneumatic and Electric Hoists, 600# to 4,000#.

Also: Floor and Portable Scales; Fans and Blowers; Hydraulic Lift Trucks 3,500# to 6,000# Capacity; Merry-Go-Round Conveyor Pouring System; Snagging and Swing Grinders; Annealing and Carburizing Furnaces; Core Ovens; Machine and Pattern Shops; Etc., Etc.

Approx. 300 Ton Heavy Duty, Solid Cast and Welded Steel Flasks, Sizes from 16"x16"x6" to 72"x72"x15".

Free Illustrated Auction Circular on Request
Inspection: August 1 to Date of Sale
WIRE, WRITE OR PHONE

INDUSTRIAL PLANTS CORPORATION

Auctioneers, Appraisers, Liquidators

316 S. LaSalle St. Chicago 4, Ill., WAbash 2-7315

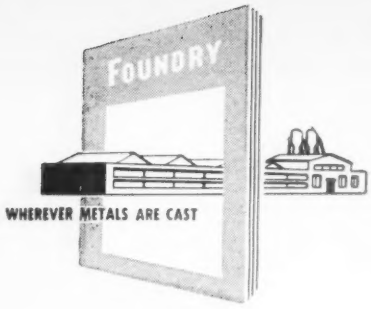
NEW YORK • TOLEDO • DETROIT

FOR SALE

2—24" x 24' Belt Conveyors, 5 H.P. 220/440V. 3ph. 60cy.
1—#405-79 Osborn Rollover and Pattern Draw Molding Machine.
1—#405 Osborn Rollover and Pattern Draw Molding Machine.
1—#147 Osborn Rockover and Draw Machine, for long jobs.
4—#814-P Osborn Jolt Squeeze Strippers, 14" squeeze cyl., 700# jolt cap.
2—601-13 Osborn Jolt Rollover and Pattern Draw, 600# jolt cap., 10" draw, flask size 30" x 24".
2—Tabor Jolt Squeeze Molding Machines.
1—Spo Jolt Squeeze Molding Machine, #110-P.
3—Model 2166 Spo Jolt Squeeze Pin Lift Molding Machines.
1—International Jolt Ram, Power Pin Lift, Type JDP Molding Machine, 1200# cap., 8" draw.
1—#1 Demmler Core Blower—New.
1—#3E Demmler Core Blower, A-1 cond.
1—Simplicity Shakeout (Core Knock-out) 4' x 8'.
1—Simplicity Shakeout, 4' x 6', ser. #46-SOB-232.
1—Kane & Roach Wire Straightener, 3/16" to ½" wire 7½ H.P., 440V. 3ph. 60cy.
1—#404 Clearfield Muller, 4 cu ft. 220V. 3ph. 60cy.
1—3 H.P. double stand grinder, belt driven.
1—40 H.P. Pennsylvania Air Compressor.
2—3 H.P. Blowers for furnaces.
1—5 H.P. Blower for furnace.
2—Micromax Instruments Leeds & Northrup Temperature Control.
2—Spencer Turbine Cupola Blowers with 50 H.P. motors, 220/440V., 3ph. 60cy., A-1 cond.
1—Revolving Core Conveyor Table (Busch-Lawrence) like new.
1—Fin Cleaning Machine (Ireland) for cleaning fins on castings, like new.
1—American Wheelabrator, 48" x 42". Model 450 ser. #A24119 A-1 cond.
1—Eclipse Salt Bath Furnace, M-225, gas fired.
1—Jones Worm Gear Reducer, Driving shaft 900 RPM, Ratio 8 to 1, Mounted on C.I. base with 15 H.P. Allis-Chalmers motor, 3ph. 60cy. 440V. 1150 RPM.
1—Coleman Horizontal Continuous Mold Oven oil fired, recirculating heating system, forced cooling system. 54'0" long incl. cooling zone x 15'0" wide, 8'8" high. Length of conveyor 76'0". 440V. 3ph. 60cy. motors.
1—Herman Rollover & Pattern Draw heavy duty 6000# series Molding Machine 40" x 48" table. A-1 condition.
1—Herman Pitless type 4000# series Rollover & Pattern Draw Molding Machine. A-1 condition.
1—Spo Rockover Draw Machine, 12" stroke, 38" x 46" table. A-1 condition.
3—500# Campbell-Hausfeld Aluminum Tilting Furnaces. A-1 condition.
1—Pig Mold Conveyor—Link Belt, complete with 3 Pouring Ladles. A-1 condition.
8—#2047 Osborn Jolt Rollover Molding Machines for Cylinder head core production.
8—#2048 Osborn Rollover Molding Machines for Cylinder head core production. A-1 condition.
1—North American Turbine Blower 20H.P. 220/440V. 3ph. 60cy. 24oz. pressure, 1900 CEM. A-1 condition.
3—Tumbling Mills 30" x 60".
Various sizes of used Steel Flask.
Various sizes of Hines Popoff Flasks and Jackets.

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

15019 Saranac Rd., Cleveland 10, Ohio Telephone—GLenville 1-1538



BUSINESS STAFF

GEORGE A. POPE, *Business Manager*

New York ..... J. F. AHRENS, J. L. OZANNE
Chicago ..... A. W. JOHANSEN, R. Z. CHEW JR.
Cleveland ..... A. L. KLINGEMAN, J. K. GILLAM
Los Angeles ..... F. J. FULLER
Griffin, Ga. ..... F. J. ALLEN

Market Research and Promotion

DAVID D. GIBBS
GEORGE J. AUNER
BETTY HINTON
BERNICE L. PLUMER

Circulation Department

G. R. EBERSOLE, *Manager*

Classified Advertising Department

MARY JANE KIMPEL, *Manager*

Production Department

RICHARD J. STRNAD, *Manager*

Main Office

Penton Building, Cleveland 13, Ohio
Main 1-8260

Branch Offices

New York, 17 ..... 60 East 42nd St.
Murray Hill 2-2581
Chicago, 11 ..... 520 N. Michigan Ave.
Whitehall 4-1234
Detroit, 2 ..... 6560 Cass Ave.
Trinity 5-3024
Los Angeles, 48 ..... 6262 Commodore Sloat Dr.
Webster 1-6865
Pittsburgh, 19 ..... 2837 Koppers Building
Atlantic 1-3211
Washington, 4 ..... 1123 National Press Building
Executive 6849
London ..... 2 Caxton St.
Westminster, S.W. 1
Griffin, Ga. ..... 331 South 12th St.

Published monthly by

THE PENTON PUBLISHING COMPANY

G. O. HAYS ..... *President and Treasurer*
E. L. SHANER ..... Chairman
R. C. JAENKE ..... *Vice Pres., Director of Adv.*
F. G. STEINEBACH ..... *Vice Pres., and Secretary*
J. P. LIPKA ..... *Asst. Secy. and Asst. Treas.*

Also publisher of STEEL • MACHINE DESIGN
NEW EQUIPMENT DIGEST

Subscription: United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $3; two years $5. Other foreign countries, one year, $10. Single copies 50 cents. Copies published three months or more previous to date of current issue, 75 cents.

Member: National Business Publications, Inc.; National Association of Magazine Publishers, and Society of Business Magazine Editors.

Copyright 1952 by THE PENTON PUBLISHING CO.

Entered as second class matter at postoffice at Cleveland, Ohio, under act of March 3, 1879.

FOUNDRY is indexed regularly by
Engineering Index Inc.
29 West 39th St., New York 18.

ADVERTISING

A

Accurate Match Plate Co. 197
Acheson Colloids Co. 189
Acme Foundry Co. 274
Adams Co., The 211
Air Reduction 227
Ajax Electric Co., Inc. 224
Ajax Electric Furnace Corp. 224
Ajax Electro Metallurgical Corp. 224
Ajax Electrothermic Corp. 224
Ajax Engineering Corp. 224
Allen Industrial Products, Inc. 214
Allied Checimal & Dye Corp., Semet-Solvay Div. 271
Allied Chemical & Dye Corp., Solvay Process Div. 179
Allis-Chalmers 61
Allis-Chalmers, Tractor Div. 81
Alloy Metal Abrasive Co. 287
Alter Co. 275
Aluminum Co. of America 70
American Air Filter Co., Inc. 36, 37
American Bridge Div., U. S. Steel Co. 279
American Chain & Cable, American Chain Div. 283
American Chain Div., American Chain & Cable 283
American Clay Forming Co. 244
American Colloid Co. 228
American Lacquer Solvents Co. 291
American MonoRail Co., The 82
American Refractories & Crucible Corp. 243
American Silica Sand Co. 63
American Smelting & Refining Co. 284
American Steel Abrasive Co., The 290
American Wheelabrator & Equipment Corp. 26, 27, 250, 251
Apex Smelting Co. 121, 259
Archer-Daniels-Midland Co., Foundry Products Div. 4, 5
Atlantic Abrasive Corp. 246

B

Babcock & Wilcox Co., The, Refractories Div. 25
Bakelite Co., A Div. of Union Carbide & Carbon Corp. 18
Baker Perkins, Inc. 213
Baroid Sales Div., National Lead Co. 272
Bartlett, C. O., & Snow Co., The ..... Back Cover
Bassichis Co., The 289
Bay State Abrasive Products Co. 131
Beardsley & Piper Div. of Pettibone Mulliken Corp. 149, 150, 151, 152
Beck, P. C., Co. 254
Bedford Tool & Forge Co. 262
Bell, M. A., Co. 291
Bellows Co., The 129
Black, Sivalls & Bryson, Inc. 66
Blastcrete Equipment Co., Inc. 275
Blaw-Knox Div. of Blaw-Knox Co. 280
Boston Woven Hose & Rubber Co. 74
Bradley Washfountain Co. 256
Browning, Victor R., & Co., Inc. 244
Buffalo Pattern Works, Inc. 136
Bullard, Geo. H., Co., Inc. 288

C

Campbell-Hausfeld Co., The 255
Carborundum Co., The 124, 142, 143, 215, 246
Carl-Mayer Corp., The 31
Carman, Edwin S., Inc. 280
Cast-Master, Inc. 277
Centrifugal Casting Machine Co. 291
Chicago Wheel & Manufacturing Co. 267
Chisholm-Moore Hoist Corp. 226
Christiansen Corp. 141
Cities Service Oil Co. 229
Clark Cast Steel Cement Co., The 284
Clark Equipment Co., Industrial Truck Div. 247
Clearfield Machine Co. 208
Cleco Div. of the Reed Roller Bit Co. 41
Cleveland Chaplet & Manufacturing Co. 274
Cleveland Crane & Engineering Co., The, Cleveland Tramrail Div. 76
Cleveland Flux Co., The 157
Cleveland Metal Abrasive Co., The 132
Cleveland Tramrail Div., The Cleveland Crane & Engineering Co. 76
Columbia-Southern Chemical Corp. 275
Columbus McKinnon Chain Corp. 226
Continental Copper & Steel Industries, Inc., Niagara Falls Smelting & Refining Div. 80
Corn Products Refining Co. 42
Crobaugh, Frank L., Co., The 282

D

Daniels, C. R., Inc., Belting Div. 279
Dayton Pneumatic Tool Co. 277
DeBardeleben Coal Corp. 278
Delta Oil Products Co. 54
Demmler, Wm., & Bros. 44, 45, 276
Denver Equipment Co. 8
Desmond-Stephan Manufacturing Co., The 273
Despatch Oven Co. 175
Detroit Electric Furnace Div., Kuhlman Electric Co. 65
Detroit Testing Machine Co. 268
Dietert, Harry W., Co. 278
Dings Magnetic Separator Co. 53
DoAll Co., The 19
Dougherty Lumber Co. 280
Dracco Corp. 201
Dravo Corp., Heating Department 71
Dresser Industries, Inc., Roots-Connersville Blower Corp. Div. 242

E

Eastern Clay Products Dept., International Minerals & Chemical Corp. 182
Eastman Kodak Co., X-Ray Div. 177
Eaton Chemical & Dyestuff Co. 280
Electric Furnace Co., The 282
Electro Metallurgical Co. A Div. of Union Carbide & Carbon Corp. 24
Electro Refractories & Abrasives Corp. 210
Empire Varnish Co., The, Waterlox Div. 277

F

Fabreeka Products Co., Inc. 64
Fanner Manufacturing Co., The 15
Far East Patternmakers Guild 284
Farquhar, A. B., Co. 263
Federal Foundry Supply Co., The 2, 20, 21
Flexible Steel Lacing Co. 274
Foundry Equipment Co., The 9
Foundry Rubber, Inc. 200
Foundry Services, Inc. 270
Fox Grinders, Inc. 232
Fremont Flask Co., The 62
Fuller Co. 72

INDEX

G

Gardner-Denver Co. 48
General Electric Co. 199
General Refractories Co. 181
Girdler Corp., The, Thermex Div. 155
Goodyear Tire & Rubber Co., The 29
Gordon, Claud S., Co. 261
Great Western Manufacturing Co. 241

H

Harbison-Walker Refractories Co. 11
Harnischfeger Corp. 207
Hauck Manufacturing Co. 279
Henry Foundry Div., The 288
Hercules Powder Co., Inc. 22
Herman Pneumatic Machine Co. 170, 171
Hickman, Williams & Co., Inc. 240
Hines Flask Co., The 50, 51
Homer Manufacturing Co., Inc., The 291
Hough, Frank G., Co., The 13
Houghton, E. F. & Co. 169
Hunt, E. Merideth 291

I

Imperial Belting Co. 10
Independent Pneumatic Tool Co. 163
Industrial Equipment Co. 40
Industrial Pattern Works 35
Ingersoll-Rand 191
International Graphite and Electrode Division, Speer Carbon Co. 173
International Minerals & Chemical Corp., Eastern Clay Products Dept. 182
International Molding Machine Co. 230, 231
International Nickel Co., Inc., The 1

J

Jackson Iron & Steel Co., The 278
Jeffrey Manufacturing Co., The 69
Johns-Manville 239
Johnston Mfg. Co. 265
Joy Manufacturing Co. 290

K

Kaiser Aluminum & Chemical Sales, Inc. 159
Kent Machine Co., The 281
Knapp, James H., Co., Inc. 286
Korn, Wm., Inc. 288
Kuhlman Electric Co., Detroit Electric Furnace Div. 65

L

Lanly Co., The 59
Lavin, R., & Sons, Inc. 217
Lee Rubber & Tire Corp., Republic Rubber Div. 264
Lindberg Engineering Co., Lindberg-Fisher Div. 165
Lindberg-Fisher A Div. of Lindberg Engineering Co. 165
Link-Belt Co. 28
Lithium Corp. of America Inc., Metalloy Corp. Div. 245

Mc

McDonald, B. F., Co. 267

M

Malf Tool Co. 252
Manhattan Rubber Div. 60
Markal Co. 254
Master Pneumatic Tool Co., Inc., The 281
Mathews Conveyer Co. 139
Mathieson Chemical Corp. Inside Front Cover
Maughlin, H. P., Co., The 282
Metal Blast, Inc. 233
Metallizing Company of America 285
Metalloy Corp. Div., Lithium Corp. of America Inc. 245
Milwaukee Chaplet & Manufacturing Co. 266
Modern Equipment Co. 302
Mullite Refractories Co., The 206
Multiplex Machinery Corp. 289
Murphy, Jas. A., & Co. 282

N

National Carbon Co. A Div. of Union Carbide & Carbon Corp. 119
National Engineering Co. 16, 17
National Lead Co., Baroid Sales Div. 272
National Lead Co., Titanium Alloy Manufacturing Div. 193
National Pigment Co. 58
New England Coke Co. 259
Newaygo Engineering Co. 43
Niagara Falls Smelting & Refining Div., Continental Copper & Steel Industries, Inc. 80
North American Manufacturing Co, The 77
Norton Co. 46, 47, 83
Nugent Sand Co., Inc., The 216

O

Obermayer, S., Co., The 147
Ohio Electric Manufacturing Co., The 288
Oliver Machinery Co. 286
Osborn Manufacturing Co., The 184, 185, 225

P

Pangborn Corp. 6, 7, 79
Penn Iron Works, Inc. 286
Petersen Oven Co., The, Stroman Furnace & Engineering Co. Div. 39
Pettibone Mulliken Corp., Beardsley & Piper Div. 149, 150, 151, 152
Philadelphia Coke Co. 289
Pittsburgh Crushed Steel Co. 236
Pittsburgh Lectromelt Furnace Corp. 52
Pittsburgh Metals Purifying Co. 135
Plaster Process Castings Co. 249
Pressed Steel Co., The 55
Pridmore, Harold E. 252
Producers Core Sand Corp. 289
Puro-Seal Co., The 289
Pyrometer Instrument Co., The 276

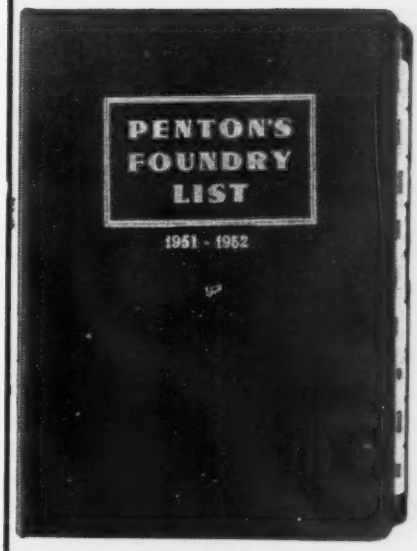
R

Radium Chemical Co., Inc. 260
Raybestos-Manhattan, Inc. 60
Reda Pump Co. 281
Redford Iron & Equipment Co. 204
Reed Roller Bit Co., Cleco Div. 41
Republic Coal & Coke Co. 287
Republic Rubber Div., Lee Rubber & Tire Corp. 264
Republic Steel Corp. 75
Research Corp. 14
Rice Pump & Machine Co. 290
Rietz Lumber Co. 256
Roots-Connersville Blower Corp. 242
Ross, J. O. Engineering Corp. 276
Roura Iron Works, Inc. 284
Royer Foundry & Machine Co. 117
Royersford Foundry & Machine Co. 278

Continued on Page 300

LIST

of today's Foundry Market



This volume helps you to know the foundry market thoroughly. The new 1951-52 Penton's foundry list provides you with the most complete information available anywhere on the 5,867 foundries in the U.S. and Canada. It tells *who* they *are*, *where* they are located, *what* they melt, how *big* they are and what departments they operate.

Many sales managers and buyers of castings say they could not get along without it. The price is reasonable. For descriptive literature, write to—

FOUNDRY

Book Department
Penton Publishing Company
Cleveland 13, Ohio

THOTS for today

from the FOUNDRY Business Staff

Dear Reader:

This is the time of year when we-the-business-staff have that dreamy look—not the faraway gaze of a vacation trip coming up nor the tired look of one just completed.

Ours is the thoughtful "look"—the one which comes from an *idea* about to pop! It's the way you look when it occurs to you what's causing those rat tails or (better still) another good slant on how you can land that order for 100,000 pieces you're about to quote on.

In our business, we undertake to prepare sales material from time to time describing the dynamic character and stature of the foundry industry for the benefit of manufacturers who do business with foundries. As a reader of FOUNDRY, you are directly involved so perhaps you might like to hear what we will be saying about your foundry industry.

Walking up the hill from the Pennsylvania Station this morning, we found ourselves musing on the universal need for castings—within 50 feet of us could be seen: manhole covers and frames, fittings on traffic control box, the traffic light itself, caps on steel light poles, parking meters, fireplugs, street lamp posts, a fire box, guy wire fittings, and a traffic sign base—*castings!*

So, an idea dawned! Why not devote our fall sales story to the dramatic presentation of the fact that virtually all durable goods and most other industries require castings as component parts or as end products themselves—automobiles, machine tools, home appliances, tractors, farm implements, trucks, ships, locomotives, railroads, aircraft, petroleum drilling, processing and refining, the armed services, hardware, radio and TV, communications, valves and fittings, construction, municipal, instruments, heating and cooking, decorative, et cetera, et cetera!

Your industry which it has been our privilege to serve for over a half century is, indeed, a market all its own—a mass production industry which last year produced over 19,000,000 net tons of castings valued at $5,000,000,000. Each hour of the working day you spend one million dollars for materials and supplies.

Population and industrial production are growing—the foundry industry is moving toward even greater heights of production and efficiency. It's nice to be "going places" and to be performing a constructive service with you and for you!

Cordially,

Business Manager
FOUNDRY

July 28, 1952

S

Schneible, Claude B., Co. 32
Schrader's, A., Son Div. of Scovill Manufacturing Co., Inc. 145
Schramm, Inc. 23
Scientific Cast Products Corp., The 245
Scovill Manufacturing Co., Inc., A. Schrader's Son Div. 145
Semet-Solvay Div., Allied Chemical & Dye Corp. 271
Shanafelt Manufacturing Co., The 49
Shepard Niles Crane & Hoist Corp. 253
Silent Hoist & Crane Co. 249
Simonds Abrasive Co. 12
Smillie, C. M., & Co. 285
Smith, Werner G., Inc. 167
Smith Oil & Refining Co. 186
Smooth-On Manufacturing Co. 287
Solvay Process Div., Allied Chemical & Dye Corp. 179
Sonken-Galamba Corp. 262
Speer Carbon Co., International Graphite and Electrode Division 173
SPO, Inc. 261
Standard Conveyor Co. 258
Standard Horse Nail Corp. 260
Stearns Magnetic, Inc. 223
Steel Shot & Grit Co. 236
Sterling Grinding Wheel Div., The 56, 57
Stevens, Frederic B., Inc. Inside Back Cover
Sterling Wheelbarrow Co. 84
Stroman Furnace & Engineering Co. Div. of The Petersen Oven Co. 39
Stulz-Sickles Co. 285
Sutter Products Co. 160, 161
Syntron Co. 271, 273

T

Tabor Manufacturing Co., The 38
Timken Roller Bearing Co., The 73
Titanium Alloy Manufacturing Div., National Lead Co. 193
Toledo Matchplate Co. 249
Transall, Inc. 192

U

Union Carbide & Carbon Corp., Bakelite Co. 18
Union Carbide & Carbon Corp., Electro Metallurgical Co. 24
Union Carbide & Carbon Corp., National Carbon Co. 119
United Compound Co. 265
United States Graphite Co., The, Div. of The Wickes Corp. 123
United States Rubber Co. 126
United States Steel Co., American Bridge Div. 279
United States Steel Corp., Subsidiaries 279
Universal Engineering Co. 30
U. S. Reduction Co. 78

V

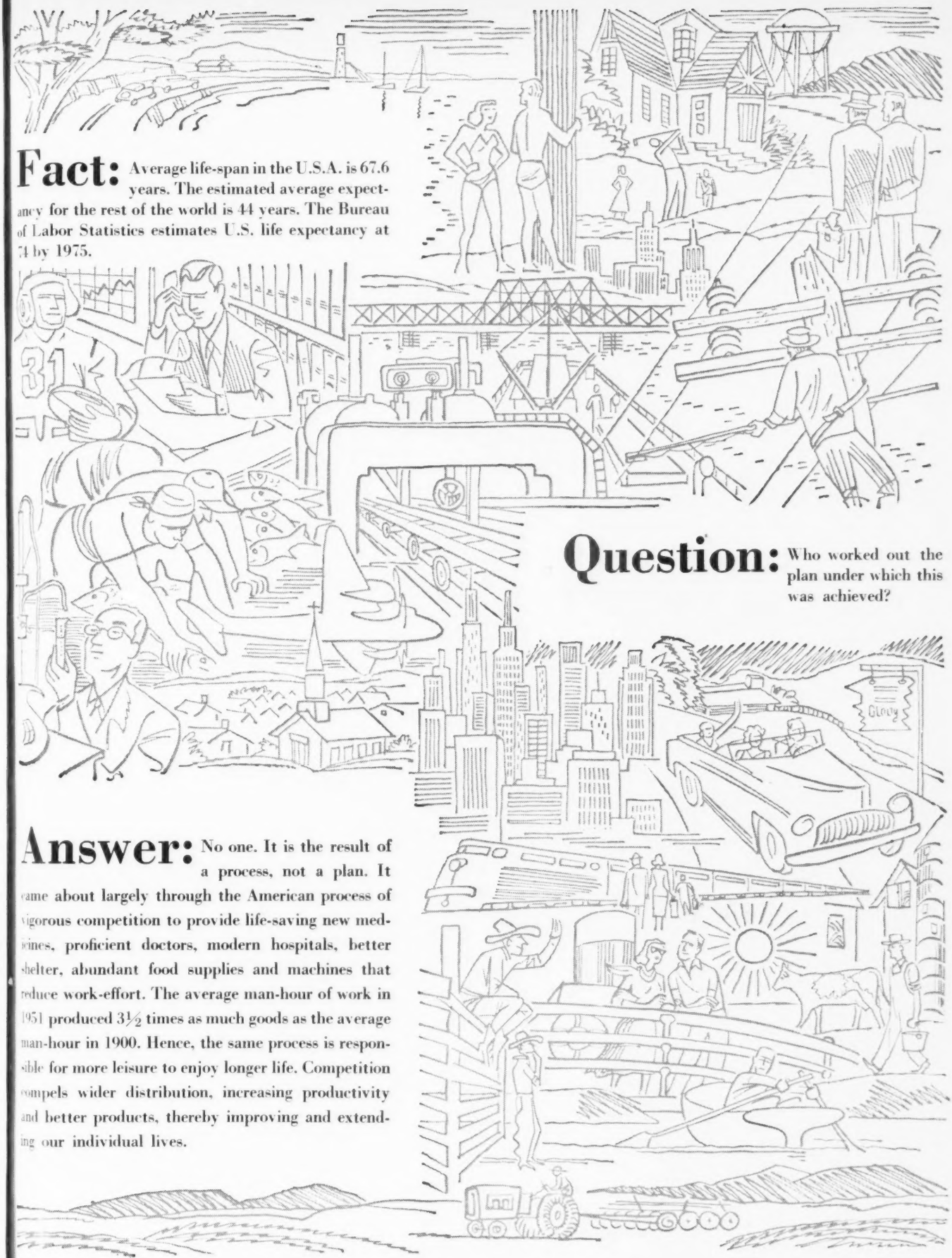
Vandium Corporation of America 202, 203

W

Walsh Refractories Corp. 195
Waterlox Div. of The Empire Varnish Co. 277
Wedron Silica Co. 268
Wellman Bronze & Aluminum Co., The 222
Wellman Engineering Co., The 282
Western Metal Co. 269
Whiting Corp. 220, 221
Wickes Corp., The, The United States Graphite Co. Div. 123
Wickland, A. A., & Co., 278
Will, Arthur E. 288

Table of Contents, Page 3

Classified Advertisers, 292, 293, 294, 295, 296, 297



Fact: Average life-span in the U.S.A. is 67.6 years. The estimated average expectancy for the rest of the world is 44 years. The Bureau of Labor Statistics estimates U.S. life expectancy at 74 by 1975.

Question: Who worked out the plan under which this was achieved?

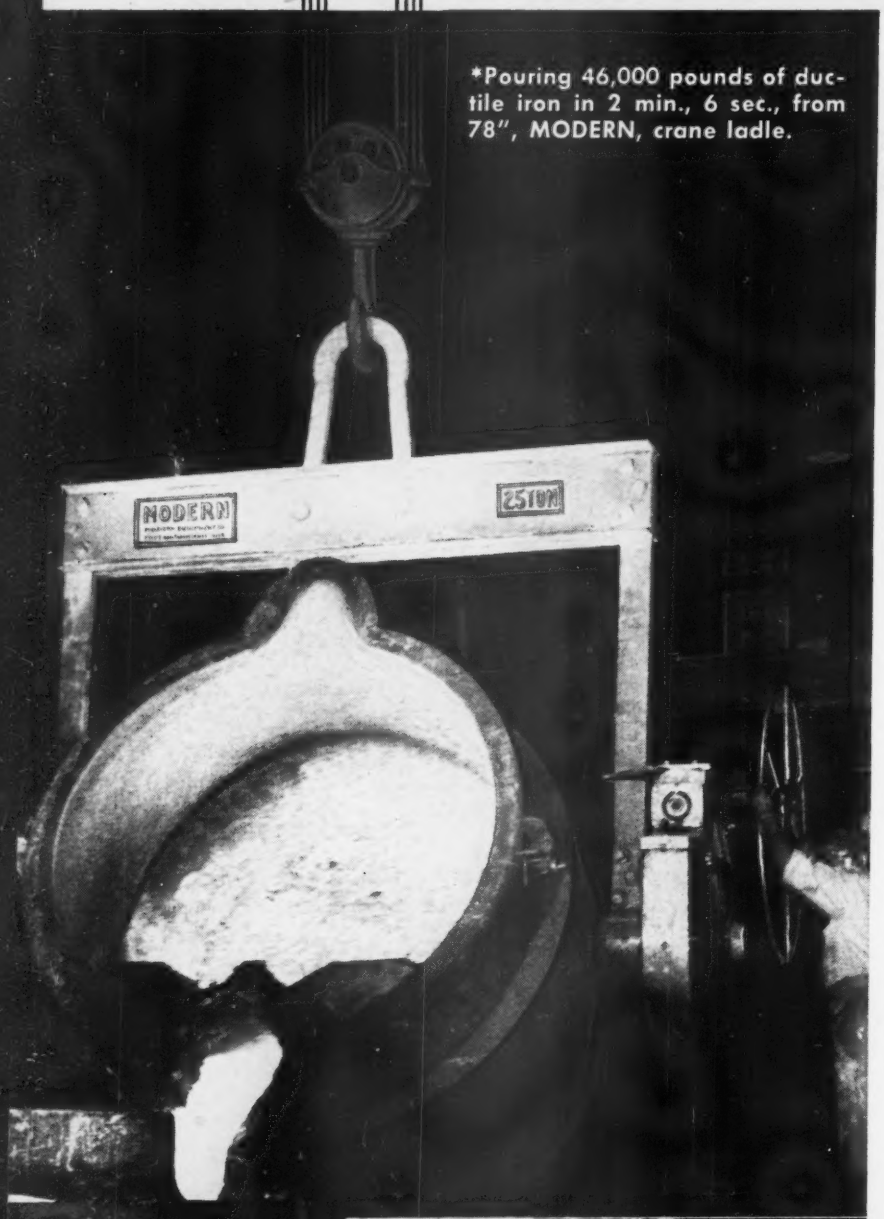
Answer: No one. It is the result of a process, not a plan. It came about largely through the American process of vigorous competition to provide life-saving new medicines, proficient doctors, modern hospitals, better shelter, abundant food supplies and machines that reduce work-effort. The average man-hour of work in 1951 produced 3½ times as much goods as the average man-hour in 1900. Hence, the same process is responsible for more leisure to enjoy longer life. Competition compels wider distribution, increasing productivity and better products, thereby improving and extending our individual lives.

THIS REPORT ON PROGRESS-FOR-PEOPLE *is published by this magazine in cooperation with National Business Publications, Inc., as a public service. This material may be used, with or without credit, in plant city advertisements, employee publications, house organs, speeches, or in any other manner.*

THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER OF PEOPLE

LADLES ENGINEERED TO THE JOB

Pay off in three Big ways...



*Pouring 46,000 pounds of ductile iron in 2 min., 6 sec., from 78", MODERN, crane ladle.

1 *UNIFORMITY OF METAL CAST . . .
2 MORE PAY-TIME OVER THE MOLD . . .
3 REDUCED WASTE, LESS PIGGING . . .

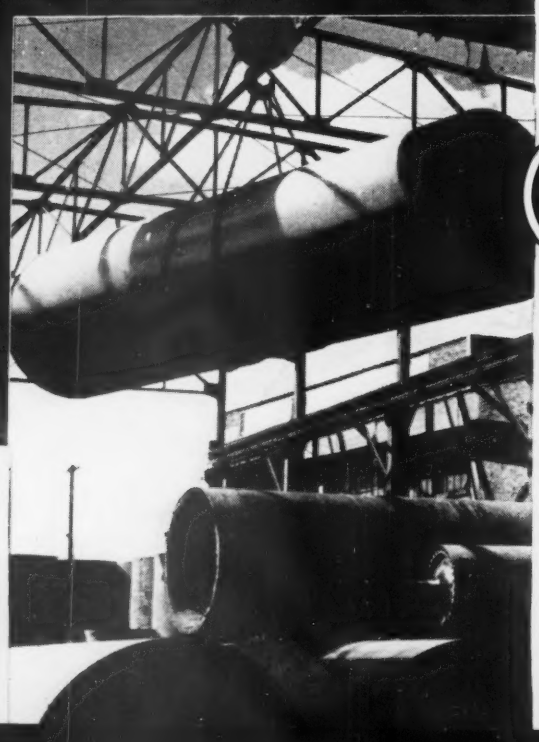
Working closely with practical foundrymen, right out on the job for more than thirty years, has qualified MODERN engineers for designing the difficult, made-to-measure jobs.

*Today it may be receiving the iron direct from cupola at a spout height of 66" and pouring the 46,000 pounds into one mold from one ladle load as shown here. This huge casting was poured in 2 min., 6 seconds. The ladle of 78" top diameter and 65" deep is balanced for use with lining of 3½".

Tomorrow the requirement may be thin-wall brass and the necessary, split-second timing as required for a one-man, non-ferrous, pouring operation from a crucible.

Always regardless of the complexities MODERN ladles are designed to serve in their one-best-way. We'd like to plan with you, too. The savings you make on your engineered-to-the job ladles can be applied to your purchases of POURING DEVICES . . . MONORAIL SYSTEMS and FOUNDRY CRANES!

If your entire problem cannot be stated on the coupon put it on your letterhead, addressed to —



The cast dryer rolls for high production paper making machines are ready for machining after casting at the Beloit Iron Works foundry.

MODERN

MODERN EQUIPMENT COMPANY
Dept. 8, Port Washington, Wisconsin

MAIL TO MY ATTENTION:

Standard ladle catalog, 149 ☐
Metal pouring systems, 147 ☐
Catalog on cupolas and charging methods, 147-A ☐
Crane and monorail systems, 150 ☐
More information on FREE use of MODERN, sound, color, 16mm films ☐

Company .....
Street .....
City ..... State .....
Att'n: .....

MODERN representatives in all parts of the world.